Growth and Development

With Special Reference to Developing Economies

A. P. THIRLWALL

FIFTH EDITION

ELBS

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Growth and Development

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A. P. THIRLWALL
Professor of Applied Economics, University of Kent at Canterbury

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To Elizabeth
For love and friendship

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Preface to the Fifth Edition

Since *Growth and Development* was first published in 1972 it has been widely used as a text for courses in economic growth and development in both developed and developing countries. In 1978, 1983 and 1989 new editions were published, and the book was taken into the Educational Low-Priced Books Scheme (formerly known as the English Language Book Society) for subsidised distribution in several developing countries. In this fifth edition, further revisions have been made to add to, and update, statistics, to include new institutional material, and to improve on the exposition to aid students and teachers alike.

The purpose of the book remains the same: to introduce students to the exciting and challenging subject of development economics, which draws on several branches of economics in order to elucidate and understand the development difficulties facing the economies of the world's poor countries. This does not mean that the book provides a recipe or blue-print for development: far from it. There can be no general recipes of this nature, and even if there were there would have to be more than economic ingredients.

The book combines description and analysis, with an emphasis on the elaboration of simple and useful theoretical economic models for an understanding of the issues that comprise the subject-matter of development economics. I make no apology for the use of conventional economic theory. I concur with Theodore Schultz, the Nobel-Prize-winning economist, who has said of development economics:

> This branch of economics has suffered from several intellectual mistakes. The major mistake has been the presumption that standard economic theory is inadequate for understanding low-income countries and that a separate economic theory is needed. Models for this purpose were widely acclaimed until it became evident that they were at best intellectual curiosities. The reaction of some economists was to turn to cultural and social explanations for the alleged poor economic performance of low income countries. Quite understandably, cultural and behavioural scholars are uneasy about this use of their studies. Fortunately the intellectual tide has begun to turn. Increasing numbers of economists have come to realise that standard economic theory is just as applicable to scarcity problems that confront low income countries as to the corresponding problems of high income countries. (T. W. Schultz, 'The Economics of Being Poor', *Journal of Political Economy*, August 1980.)

This is not to say, of course, that *all* standard theory is useful and relevant for an understanding of the development process. The relevance of static equilibrium theory may be particularly questioned. Nor is it possible to ignore non-economic factors in the growth and development process. The fact is, however, that the desire for material improvement in developing countries is very strong, and economics does have something positive to offer by way of analysis unadulterated by political, sociological and other non-economic variables. In the final analysis growth and development must be considered an economic process in the important practical sense that it is unlikely to proceed very far in the absence of an increase in the quantity and quality of the resources available for production. The book lays particular emphasis on the economic obstacles to development and the economic means by which developing countries may raise their rate of growth of output and living standards.

For those new to the book, or for those now using the fourth edition, I outline below the main contents of each chapter and the changes introduced into the fifth edition.

Chapter 1 portrays various dimensions of the development gap between rich and poor countries, and includes sections on income distribution, unemployment, nutrition, health, education, and the basic needs approach to development pioneered by the World Bank. There are new sections on the measurement of poverty; on the attempt by the United Nations Development Programme (UNDP) to construct a Human Welfare Index; and on research as to whether the developing countries are catching up with the developed countries in terms of productivity and levels of *per capita* income. The mutual interdependence of the world economy is emphasised, and there is discussion of the call for a New International Economic Order. The latest statistics are given for all the main dimensions of the development gap.

Chapter 2 is on the production-function approach to the measurement of the sources of growth. This chapter stays unchanged except for the reporting of new empirical studies, including one from the World Bank. However, it is important to continue to stress that the approach cannot tell us *why* factor supplies and productivity grow at different rates between countries. The production-function approach is essentially a supply-orientated approach to growth which treats the supply of factors of production as exogenous to an economic system. In practice, growth is likely to be demand-constrained, particularly by the balance of payments in an open economy, and factor supplies are likely to be endogenous to an economic system. Given the growth of output permitted by demand, however, it is interesting to apportion this growth between quantity and quality improvements in the various factors of production on the one hand and technical progress on the other.

Chapter 3 deals with the role of agriculture and surplus labour in the development process. Particular attention is paid to the influential Lewis model of economic development with unlimited supplies of labour. There is explicit treatment, following on from Lewis, of the interaction and complementarity between agriculture and industry, with a number of interesting insights concerning the importance of demand expansion from agriculture as a stimulus to industrial growth and of achieving an equilibrium terms of trade between the two sectors. New studies are reported on the supply response of agriculture.

Chapter 4 is on the role of capital accumulation and technical progress in the development process, and remains unchanged.

Chapter 5 is on dualism and Myrdal's concept of the process of circular and cumulative causation. This chapter describes the various mechanisms by which economic divisions between regions and countries tend to be perpetuated and widened. The chapter includes the early centre–periphery models of Prebisch and Seers, and the views of Marxist writers, including Emmanuel's model of unequal exchange.

Chapter 6 is on population and development and attempts to evaluate the debate on whether population expansion is a growth-inducing or retarding force. Particular attention is devoted to the work of Enke and to the recent work of Simon.

Chapter 7 is on the case for planning and raises some of the broader issues of development strategy, including early discussion of investment criteria.

Chapter 8 is devoted exclusively to social cost–benefit analysis, and has been largely rewritten to make a clearer distinction between the financial, economic and social appraisal of projects. The major emphasis is on comparing and contrasting the approaches of Little and Mirrlees (using world prices) on the one hand and the United Nations (using domestic prices and shadow exchange rates) on the other. More attention is given to the relation between the shadow exchange rate and the standard conversion factor used by Little and Mirrlees for the repricing of non-traded goods. The chapter contains a lengthy discussion of the determination of the shadow wage rate, and how to take account of the distributional effects of project choice.

Chapter 9 is a new chapter written by my colleague Dr John Peirson on how environmental issues may be incorporated into social cost–benefit analysis, and on the new and important concept of sustainable development.

Chapter 10 is concerned with the choice of techniques and with the potential conflicts involved in moving towards the use of more labour-intensive techniques: between employment and output on the one hand, and between employment and saving on the other. The role played by multinational corporations in dictating technological choice is also examined.

Chapter 11 introduces the student to the technique of input–output analysis and its role in planning and forecasting. It is shown how input–output analysis can be used for forecasting output, import requirements, labour and capital requirements. There is a new section on linkage analysis and on tests of the hypothesis that countries which encourage activities with the highest backward and forward linkages grow the fastest.

Chapter 12 gives an elementary exposition of the technique of linear programming.

Chapter 13 turns to the finance of development from domestic sources and includes extensive discussion of the various means to raise the level of saving, including forced saving through inflation. There is consideration of the role of monetary and fiscal policy, including discussion of tax reform and a new section on the theory and practice of financial liberalisation.

Chapter 14 looks at the finance of development from external sources, and the debt-servicing problems created by foreign borrowing. The debt crisis that arose in the 1980s, and which still lingers, is thoroughly surveyed, and there is a new section on solutions to the debt crisis and the progress that has been made so far on the basis of various initiatives. All the statistics relating to foreign resource inflows have been updated to 1990/91. The whole aid debate is reviewed, plus the advantages and disadvantages of private foreign investment. There is a new section on the activities of the World Bank, and on the theory and practice of Structural Adjustment Programmes.

Chapter 15 is devoted to the topic of trade and development. The gains from trade are thoroughly explored, as are the ways in which the present pattern of trade works to the relative disadvantage of developing countries. The tendency for the terms of trade to deteriorate, and for balance-of-payments difficulties to arise, is stressed. The case for protection, and the relative merits of import substitution and export promotion, are examined. New studies are reported on the relation between trade performance and economic performance.

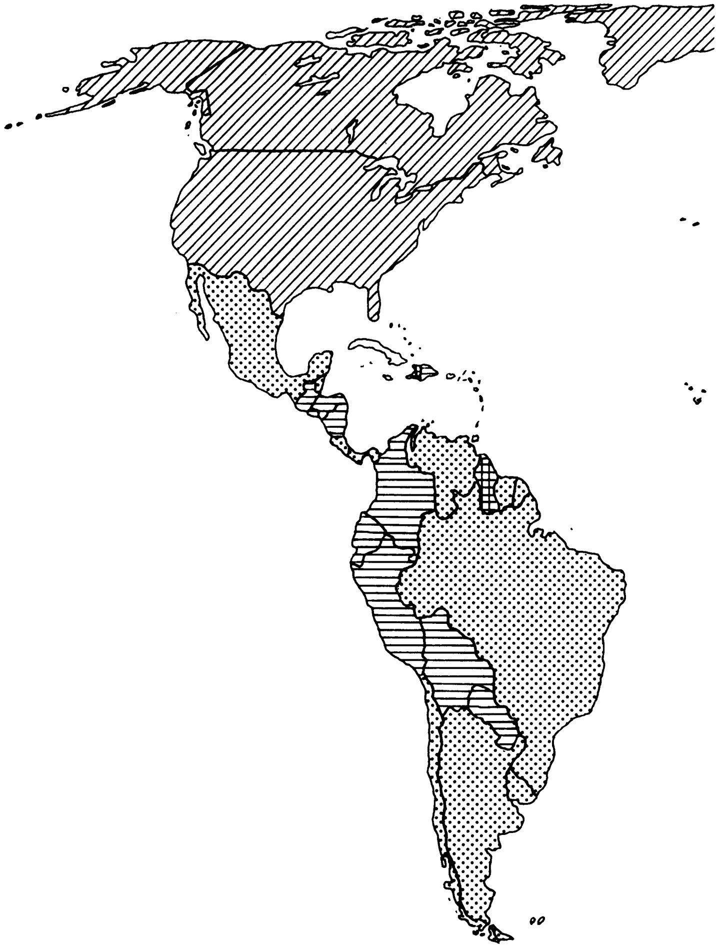
Chapter 16 is on the balance of payments and development and discusses the important concept of balance-of-payments constrained growth and the various policy responses to this constraint at the national and international level. The latter involves a consideration of the extensive facilities afforded by the International Monetary Fund for balance-of-payments support. Some of the criticisms levelled at the IMF are also considered, including the relevance of devaluation. The chapter ends with a discussion of special drawing rights as a potential form of international assistance to developing countries.

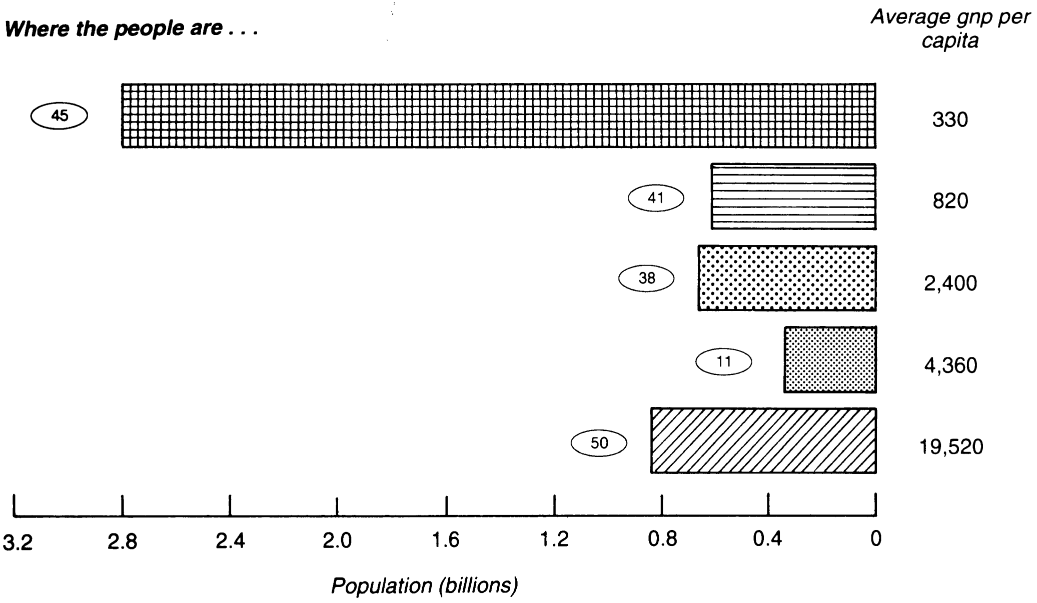
By the time the sixth edition of this book becomes due in 1999, the facts pertaining to developing countries will again be out of date, and no doubt there will have been new institutional changes and new innovations in thinking about development strategy. To keep abreast with what is going on students are encouraged to consult such publications as the *World Development Report* and *Finance and Development* (published quarterly in several different languages by the IMF and World Bank), and journals such as *World Development, Journal of Development Studies, Journal of Development Economics, Economic Development and Cultural Change*, and the *World Bank Economic Review*.

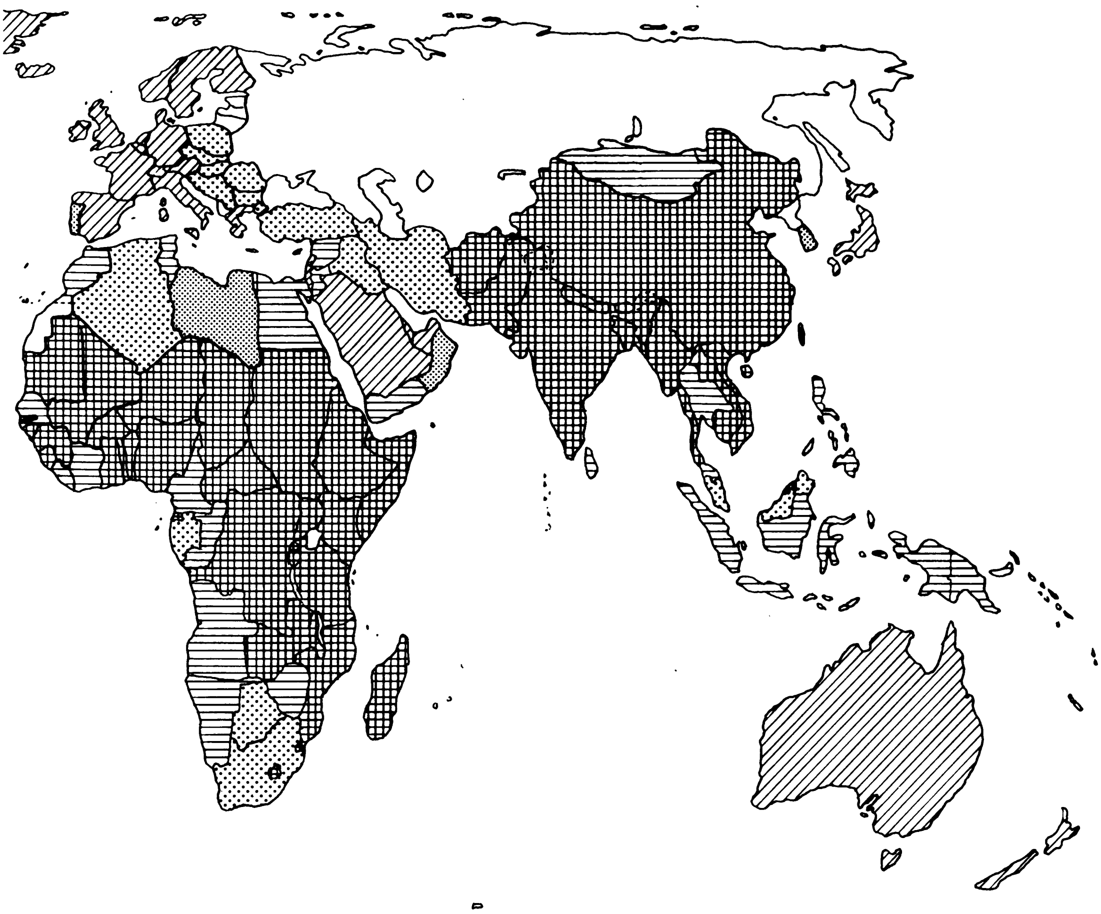
I am deeply grateful to Celine Noronha for preparing the manuscript for this new edition; to Elizabeth Schachter for checking the proofs; to Keith Povey, Stephen Rutt and Jane Powell for editorial assistance; and to Jackie Butterley for compiling the index.

Canterbury, January 1993 A. P. THIRLWALL

GNP Per Capita Map of the World







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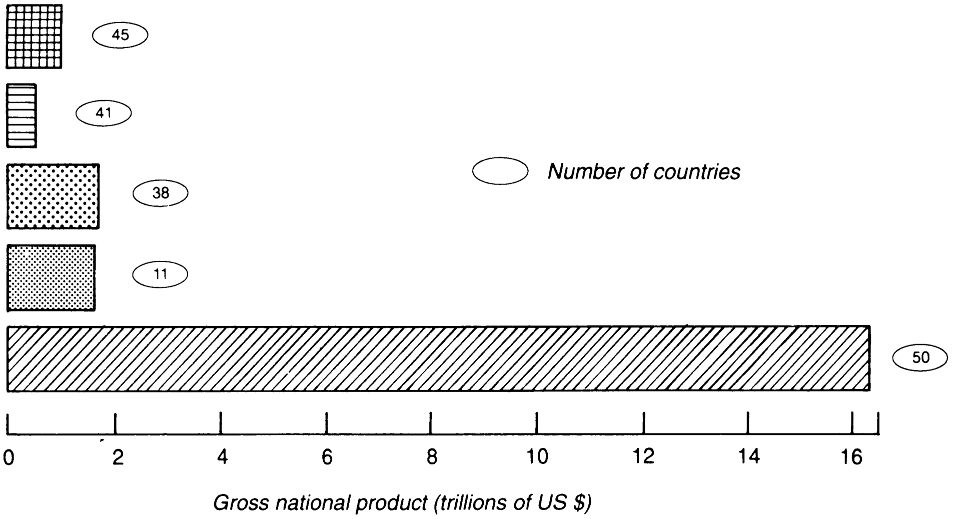

The First Law of Development

'For unto everyone that hath shall be given and he shall have abundance, but from him that hath not shall be taken away even that which he hath.'

(MATTHEW 25:29)

Part I
Introduction

■ Chapter 1 ■

Development and Underdevelopment

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Current Interest in Development Economics

Current academic interest in development economics, and the study of development economics as a separate subject, are relatively recent phenomena. For the student today it will be difficult to appreciate that as recently as thirty years ago a course in development economics was a rare feature of an undergraduate programme in economics, and that textbooks on economic development were few and far between. Today no self-respecting department of economics is without a course in economic development; there are scores of texts; hundreds of case studies; and thousands of articles on the subject. And, as in medicine, the perceived ills seem to multiply as the diagnosis deepens.

The political and public concern with the poorer nations of the world is of equally recent origin. The majority of the national and international bodies to promote development that exist today, such as national development banks, the World Bank and its affiliates, and agencies of the United Nations, have all been established since the Second World War. Before the war, when most of today's poor countries were still colonies, there was very little preoccupation with the economic and social problems of the developing (dependent) economies that we are concerned with today. Perhaps the facts were not so well known, or perhaps it was that the attention of most people was focused on the depression and underemployment in the developed countries. Whatever the reason for neglect, the situation today is very different. The development of the Third World (the collective name for the developing countries), meaning above all the eradication of primary poverty, is now regarded as one of the greatest social and economic challenges facing mankind.

What accounts for this change in attitude and upsurge of interest in the economics of development and in the economies of poor countries? A number of factors can be pinpointed, which interrelate with each other. First, in the wake of the great depression and in the aftermath of war there was a renewed academic interest among professional economists in the growth and development process and in the theory and practice of planning. Second, the poor countries themselves have become increasingly aware of their own backwardness, which has led to a natural desire for more rapid economic progress. The absolute numbers of poor people are considerably greater now than in the past, which has struck a humanitarian chord. Third, there has been a growing recognition by all concerned of the mutual interdependence of the world economy. The political and military ramifications and dangers of a world divided into rich and poor countries are far more serious now than they were in the past; at the same time the old Cold War led the major developed countries to show a growing economic and political interest in poor and ideologically uncommitted nations. The recognition of interdependence has been heightened in recent years by fears of shortages of basic raw materials produced primarily in Third World countries, and by the rising price of oil.

Academic Interest in Development

Academic interest in the mechanics of growth and development is a *renewed* interest rather than a new preoccupation of economists. The progress and material well-being of men and nations have traditionally been at the centre of economic writing and enquiry. It constituted one of the major areas of interest of the classical economists. Adam Smith, David Ricardo, Thomas Malthus, John Stuart Mill and Karl Marx all dealt at some length (with divergent opinions on many issues) with the causes and consequences of economic advance. It is entirely natural that thinkers of the day should comment on the contemporary scene, and there is perhaps an analogy here between the preoccupation of the classical economists at the time of Britain's industrial revolution and the concern of many economists today with the economics of development and world poverty, the nature of which has been brought to the attention of the world so dramatically in recent decades. Development also represents a challenge equivalent to that of depression and mass unemployment in the 1930s which attracted so many brilliant minds to economics, Keynes among them. But the nature of the challenge is of course very different. In the case of unemployment in the 1930s, there was an orthodox theory with which to grapple; the task was to formulate a theory to fit the facts and to offer policy prescriptions. As it turned out, the solution to the problem was to be costless: expand demand by creating credit and bring idle resources into play. Fancy, an economic problem solved costlessly! The challenge of development is very different. There is no divorce between theory and the observed facts. The mainsprings of growth and development are well known: increases in the quantity and quality of resources of all kinds. Countries are poor because they lack resources or the willingness and ability to bring them into use. The problems posed by underdevelopment cannot be solved costlessly. It would be reassuring to think, however, that advances in growth theory, coupled with more detailed knowledge of the sources of growth, and the refinement of techniques for planning and resource allocation, have all increased the possibility of more rapid economic progress than hitherto. Certainly particular theoretical models and techniques have been used extensively in some countries, presumably in this belief. For example, models for calculating investment requirements to achieve a target rate of growth invariably form an integral part of a development plan, and in some countries there have been experiments in recent years with such techniques as input–output analysis, for the achievement of sectoral balance and the avoidance of bottlenecks, and linear programming for the achievement of efficient resource allocation.

The question is often posed as to what lessons, if any, the present developing countries can draw from the first-hand observations of the classical writers, or more directly from the development experience of the present advanced nations. One obvious lesson is that while development can be regarded as a natural phenomenon, it is also a lengthy process, at least left to itself. It is easy to forget that it took Europe the best part of three centuries to progress from a subsistence state to economic maturity. Much of development economics is concerned with the time scale of development, and how to speed up the process of development without causing problems as acute and worrisome as the primary poverty it is desired to alleviate. In the next millennium, when primary poverty in most countries will, it is hoped, have been eradicated, courses in development economics will undoubtedly take a different form. The emphasis will be on inter-country comparisons, rather than on the process of development as such and the growth pains accompanying the transition from a primarily agrarian to an industrial economy.

As far as classical theory is concerned, the gloomy prognostication of Ricardo, Malthus and Mill that progress will end ultimately in stagnation would seem to be unfounded. It has certainly been confounded by experience. Population growth and diminishing returns have not been uniformly depressive to the extent that Ricardo and Malthus supposed. Rising productivity and *per capita* incomes appear quite compatible with the growth of population and the extension of agriculture. Classical development economics greatly underestimated the beneficient role of technical progress and international trade in the development process. It is these two factors above all which seem to have confounded the pessimism of much of classical theory. With access to superior technology there is hope, and some evidence, that material progress in today's developing countries will be much more rapid than in countries at a similar stage of development one hundred years ago. The pool of technology on which to draw, and the scope for its assimilation, is enormous. Used with discretion, it must be considered as the main means of increasing welfare. The role of trade, however, is more problematic. A lot will depend on how rapidly the developing countries can alter their industrial structure and on movements in the terms of trade. Currently the developing countries are probably in an inferior position compared with the present advanced countries at a comparable stage of their economic history. The dynamic gains from trade are present but the static efficiency gains are less and the terms of trade in most commodities are worse. The gains from trade accrue mainly to the rich industrialised countries, notwithstanding the rapid increase that periodically takes place in some commodity prices. The fact that the gains from trade are unequally distributed does not destroy, of course, the potential link between trade and growth, or constitute an argument against trade. Rather, it represents a challenge for altering the structure of trade and the terms on which it takes place.

The greater knowledge and acceptance of planning may also mean that the development experience of the present developing countries will be less protracted and painful than in the past. Planning can potentially mobilise the prerequisites of development more expeditiously than the market mechanism, which takes time to operate, and provided attention is paid to income distribution, the sum total of sacrifice of present generations need be no more severe per individual. Classical economists were generally antithetical to interference with the market mechanism, believing that the free play of market forces would maximise the social good. But fashions change in economics, and after the Second World War, there was a much greater acceptance of interference with the market mechanism, and planning in developing countries was seen by many as one of the main means by which development may be accelerated. The experience of planning in many countries, however, has not been favourable, and planning has come into disrepute, not the least because of the economic disarray of the rigidly planned economies of the old Soviet Union and Eastern Europe. It should never be forgotten, however, that no country in the world made such swift economic advance in such a short space of time as the Soviet Union after 1918, through the planned allocation of resources which favoured investment at the expense of consumption. The fact that planning may be operated too rigidly, or for too long and go wrong, should not be allowed to obscure the fact that it also has merits, and that unfettered free enterprise can also lead to economic disaster and social deprivation. What is required in most developing countries is a judicious mix of public and private enterprise, of the use of markets combined with different types of planning, for the maximisation of social welfare.

Planning requires a certain amount of model-building and this, too, has been inspired by economists. The most common type of model, which forms the basis of much of the model-building that developing countries indulge in, is to calculate the investment requirements necessary to achieve a target rate of growth of *per capita* income – commonly referred to as a Harrod–Domar model. Neither the models of Harrod (1948) or Domar (1947) were designed for the purpose to which they are now put in developing countries, but their growth equations have proved to be an indispensable component of macro-economic planning. We shall consider later the strengths and weaknesses of using this type of aggregate model in development planning, and the pros and cons of planning in general.

The New International Economic Order

A second major factor accounting for the upsurge of interest in the growth and development process has been the poor nations' own increased awareness of their inferior economic and political status in the world, and their desire for material improvement and greater political recognition through economic strength. This was precipitated by decolonisation and by increased contact with the developed nations, and has been strengthened from within by rising expectations as development has proceeded. Development is wanted to provide people with the basic necessities of life, for their own sake, and to provide a degree of self-esteem and freedom for people which is precluded by poverty. Wealth and material possessions may not provide greater happiness but they widen the choice of individuals, which is an important aspect of freedom and welfare. The developing countries in recent years have shown a marked determination to pull themselves up by their own bootstraps assisted, in the words of Professor Hicks, 'by such crumbs of aid as the richer countries are willing to spare, and as they themselves are willing to accept' (1966, p. 263). They have also called for a fairer deal from the functioning of the world economy which they view, with some justification, as biased in favour of countries already rich.

The official call for a **New International Economic Order** was originated by the Sixth Special Session of the United Nations General Assembly in 1974. The United Nations pledged itself 'to work urgently for the establishment of a new international economic order based on equity, sovereign equality, common interest and cooperation among all States, irrespective of their economic and social systems, which shall correct inequalities and redress existing injustices, make it possible to eliminate the widening gap between the developed and the developing countries and ensure steadily accelerating economic and social development and peace and justice for present and future generations.' The programme of action called for such things as: improved terms of trade for the exports of poor countries; greater access to the markets of developed countries for manufactured goods; greater financial assistance and the alleviation of past debt; reform of the International Monetary Fund and a greater say in decision making on international bodies concerned with trade and development issues; an international food programme, and greater technical cooperation.

The call for a New International Economic Order has been reiterated several times by various UN agencies. In 1975, the United Nations Industrial Development Organisation (UNIDO) produced the **Lima Declaration** which set a target for the developing countries to secure a 25 per cent share of world manufacturing production by the year 2000 compared with the share then of 10 per cent (and a present share of 15 per cent). This target will not be achieved since it requires a growth of manufacturing of 10 per cent per annum in developing countries compared with 5 per cent in developed countries, which is 3 per cent more than achieved from 1965 to 1990. On the monetary front, in 1980 there was the **Arusha Declaration** which demanded a UN Conference on International Money and Finance to create a new international monetary order 'capable of achieving monetary stability, restoring acceptable levels of employment and sustainable growth' and 'supportive of a process of global development'. And at the 7th Session of UNCTAD in Geneva in 1987, policy approaches were called for in four major areas: debt and development resources; commodities; international trade; and the problems of the least developed countries.

The Mutual Interdependence of the World Economy

The third major factor responsible for the growing interest and concern with Third World development has been the increasing awareness, particularly on the part of developed countries, that dependence is not one-way. The rich countries have been compelled out of economic and political necessity to rethink their economic relations with the poorer nations of the world. On the political front the old divide between East and West forced the Western capitalist and the Communist countries to compete financially for the favours of large parts of the Third World, and regretfully one of the unfortunate side-effects of the urgent desire of poor countries for improved living standards was that some allowed themselves to become a political battleground for the great powers in the Cold War.

On the economic front, the fortunes of countries, rich and poor, are locked together through trade and the balance of payments. There exists an interdependence in the world economy such that the malfunctioning of one set of economies impairs the functioning of others. This was no more evident than in the world economy in the 1980s which, owing to the rising price of energy and the debt crisis, displayed mounting economic chaos. The 1980 Brandt Report, entitled *North–South: A Programme for Survival* (1980), and its sequel *Common Crisis* (1983), stressed the mutual benefit to all countries from a sustained programme of development in the Third World, and documented the current adverse trends in the world economy which pointed to a sombre future if not tackled co-operatively: growing poverty and hunger in the Third World; rising unemployment with inflation; international monetary disorder; chronic balance of payments deficits and mounting debts in most Third World countries; protectionism, and tensions between countries competing for energy, food and raw materials. Development economics addresses itself to many of the issues contributing to disarray in the world economy.

There is not only a moral case for greater efforts to raise living standards in Third World countries, but a sheer practical case which would be in the self-interest of the developed countries themselves. The ability of poor countries to sustain their growth and development means a greater demand for the goods and services of developed countries, which generates output and employment directly and which also helps to maintain the balance-of-payments stability of these countries which is so crucial if there is to be a reciprocal demand for the goods of developing countries. Any constraint on demand in the system arising from, say, poor agricultural performance in poor countries, or a balance-of-payments constraint on demand in developed countries, will impair the functioning of the whole system and reduce the rate of progress below potential. Herein lies the importance of the transfer of resources to poor countries to maintain their momentum of development (global Keynesianism), and of international monetary reform to smooth the burden of balance-of-payments adjustment and to shift more of the burden of adjustment from the deficit to the surplus countries.

The Brandt Report called for a short-term emergency programme as a prelude to longer-term action, consisting of four major elements: a large scale transfer of resources to developing countries; an international energy strategy to minimise the dislocation caused by sudden and rapid increases in the price of oil; a global food programme; and a start on some major reforms in the international monetary system. Very little has been done.

In the longer term, the Brandt Report called for: a twenty-year programme to meet the basic needs of poor countries, involving additional resource transfers of $4 billion a year; a major effort to improve agricultural productivity to end mass hunger and malnutrition; commodity schemes to stabilise the terms of trade for primary commodities; easier access to world markets for the exports of developing countries; programmes for energy conservation; the development of more appropriate technologies for poor countries; an international progressive income tax, and levies on trade and arms production, to be used by a new World Development Fund (to fund development programmes rather than projects); a link between the creation of new international money and aid to developing countries, and policies to recycle balance-of-payments surpluses (as accumulated by the Arab oil export countries since 1973, for example) to deficit countries to remove balance-of-payments constraints on demand and to remove the risk of a slide into international protectionism. Many of these issues we shall be discussing in the course of this book.[1] Such a programme would be of mutual benefit to all parties, rich and poor. It would create investment confidence, which is the crucial ingredient maintaining the dynamics of any economic system; it would stimulate trade and investment, and help the prospects of sustained growth in the world economy.

It would be wrong to give the impression, however, that the developed countries' concern with world poverty is motivated exclusively by the selfish realisation that their own survival depends on economic and political harmony which cannot thrive in a world perpetually divided into rich and poor. There has also been an affirmation by many developed countries of a moral obligation towards poorer nations. Not all aid and development assistance is politically inspired. Particularly over the last three decades, the developed countries have shown a genuine humanitarian concern over the plight of Third World countries, which has resulted in the establishment and support of several institutions to assist developing countries, and which led the period 1960–70 to be named the First Development Decade. We are now in the Fourth Development Decade, and the pledge to assist developing countries out of humanitarian concern has been reaffirmed. The goal of a greater degree of income equality between the citizens of a nation seems to be gaining support, albeit slowly, as an objective among nations. Moreover, the propagation of this ideal is not confined to the supranational institutions that have been especially established to further it. Recent years have witnessed the spontaneous creation of several national pressure groups, in different parts of the world, whose platform is the abolition of world poverty; and the Church, which remained silent and inactive for so long, periodically makes its voice heard. Aid from voluntary agencies to developing countries now amounts to over $3.5 billion annually. But whatever the motive for concern, the reality of world poverty and underdevelopment cannot be ignored. Furthermore, primary poverty in developing countries is likely to persist for many years in the future. The economist has a special responsibility to contribute to an understanding of the economic difficulties which poor countries face and to point to possible solutions. This is a textbook devoted to that end. Let us start by considering the meaning of development and establishing the magnitude of poverty and of economic divisions in the world as precisely as the data will allow. Then we shall focus on conditions within the developing countries, particularly the employment situation, the income distribution, the level of nutrition, and other basic needs.

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[1] For a discussion and appraisal of the Brandt Report, see the collection of articles in *Third World Quarterly*, October 1980, and Kirkpatrick and Nixson (1981).

The Meaning of Development and the Challenge of Development Economics

Development implies change, and this is one sense in which the term development is used; to describe the process of economic and social transformation within countries. This process often follows a well-ordered sequence and exhibits common characteristics across countries which we shall discuss later in the chapter. But if development becomes an objective of policy, the important question arises of development for what? Not so long ago, the concept of development, defined in the sense of an objective or a desired state of affairs, was conceived of almost exclusively in terms of growth targets, with very little regard to the beneficiaries of growth or to the composition of output. Societies are not indifferent, however, to the distributional consequences of economic policy; to the type of output that is produced, or to the economic environment in which it is produced. A concept of development is required which embraces the major economic and social objectives and values that societies strive for. This is not easy. Perhaps the best attempt to date is that by Goulet (1971) who distinguishes three basic components or core values in this wider meaning of development, which he calls **life-sustenance, self-esteem and freedom.**

Life-sustenance is concerned with the provision of basic needs, which we discuss later in the chapter. The basic needs approach to development was initiated by the World Bank in the 1970s. No country can be regarded as fully developed if it cannot provide all its people with such basic needs as housing, clothing, food and minimal education. A major objective of development must be to raise people out of primary poverty and to provide basic needs simultaneously.

Self-esteem is concerned with the feeling of self-respect and independence. No country can be regarded as fully developed if it is exploited by others and does not have the power and influence to conduct relations on equal terms. Developing countries seek development for self-esteem; to eradicate the feeling of dominance and dependence which is associated with inferior economic status.

Freedom refers to freedom from the three evils of 'want, ignorance and squalor' so that people are more able to determine their own destiny. No man is free if he cannot choose; if he is imprisoned by living on the margin of subsistence with no education and no skills. The advantage of material development is that it expands the range of human choice open to individuals and societies at large.

All three of these core components are interrelated. Lack of self-esteem and freedom result from low levels of life sustenance, and both a lack of self-esteem and economic imprisonment become links in a circular, self-perpetuating chain of poverty by producing a sense of fatalism and acceptance of the established order – the 'accommodation to poverty' as Galbraith (1980) has called it.

Using Goulet's concept of development, therefore, and in answer to the question 'development for what?', we can say that development has occurred when there has been an improvement in basic needs, when economic progress has contributed to a greater sense of self-esteem for the country and individuals within it, and when material advancement has expanded the range of choice for individuals. The fact that many of these ingredients of development are not measurable does not detract from their importance: the condition of being developed is as much a state of mind as a physical condition measurable by economic indices.

The challenge of development economics lies in the formulation of economic theory and in the application of policy in order to understand better and to meet these core components of development. Clearly the range of issues that development economics is concerned with is quite distinctive and because of this the subject has developed its own *modus vivendi* (ways of doing things), although drawing liberally on economic theory as do other branches of economics. If it is to be useful, however, a great deal of conventional economic theory must be adapted to suit the conditions prevailing in developing countries, and many of the assumptions that underly conventional economic models have to be abandoned if they are to yield fruitful insights into the development process. Static equilibrium theory, for example, is ill-suited for the analysis of growth and change and of growing inequalities in the distribution of income between individuals and countries. It is probably also true, as Todaro (1989) strongly argues, that economics needs to be viewed in the much broader perspective of the overall social system of a country, which includes values, beliefs, attitudes to effort and risk taking, religion and the class system, if development mistakes are to be avoided which stem from implementing policy based on economic theory alone.

The Perpetuation of Underdevelopment

The study of economic development helps us to understand the nature and causes of poverty in low-income countries, and the transformation of societies from being primarily rural to being primarily industrial, with the vast bulk of resources utilised in industrial activities and in service activities which serve the industrial sector. But why have some countries never participated in this process or got left behind? The first industrial revolution gave the present developed countries an initial advantage which they then sustained through the existence of various cumulative forces at work against those left behind. In the last forty years there has been a second industrial revolution which has propelled another bloc of countries (the so-called newly industrialised countries of South East Asia and Latin America) into a virtually industrialised state, and many others into a semi-industrialised state. But many countries are still left behind in a semi-feudal state, including the very poorest which have now become the prime focus of concern of the World Bank and other development agencies.

There are many theories of the perpetuation of underdevelopment but none seem to have universal validity. The state of agriculture is of foremost importance. It was, first of all, settled agriculture that laid the basis for the great civilisations in the past, and it was the increase in agricultural productivity in England in the eighteenth century that laid the basis for, and sustained, the first industrial revolution. If there is one overriding single factor which explains why some countries developed before others, and why some countries are still backward without a significant industrial sector, it lies in the condition of agriculture which in the early stages of development is the sector which must provide the purchasing power over industrial goods.

The condition of agriculture depends on many factors, institutional as well as economic, and physical conditions are also of key importance. Climate, particularly, affects the conditions of production. Heat debilitates individuals. Extremes of heat and humidity also deteriorate the quality of the soil and contribute to low productivity of certain crops. It cannot be coincidence that almost all developing countries are situated in tropical or subtropical climatic regions and that development 'took off' in the temperate zones.

The condition of agriculture has not been helped by what Lipton (1977) has called **urban bias** which has in many countries starved agriculture of resources. This has happened because ruling élites generally originate from, or identify with, the non-rural environment, and because policy-makers were led astray both by the empirical evidence which shows a high correlation between levels of development and industrialisation, and by early development models which stressed investment in industry.

Many other internal conditions have acted as barriers to progress in poor countries, which interacted in a vicious circle. In some countries population size presents a problem combined with low levels of human capital formation. The latter in turn perpetuates poverty which is associated with high birth rates and large family size. This is a form of 'accommodation to poverty' (Galbraith, (1980)) which then perpetuates low living standards in a circular process. In other countries there may not exist the psychological conditions required for modernisation built on individualism and the competitive spirit, coupled with a strong work ethic, rationalism and scientific thought, which characterised the industrial revolutions of eighteenth- and nineteenth-century Europe and which have played a large part in the emergence of the newly industrialised South East Asian countries in the latter half of the twentieth century.

External relations between countries also play a part in the poverty perpetuation process, which have given rise to structuralist and dependency theories of underdevelopment. It seems to be the general lesson of history that once one set of countries gains an economic advantage, the advantage will be sustained through a process of what Myrdal (1957) has called 'circular and cumulative causation', working through the media of factor mobility and trade. (For a full discussion, see Chapter 5.) Favoured regions denude the backward regions of capital and skilled labour, and they trade in commodities whose characteristics guarantee that the gains from trade accrue to them. Colonialism was an extreme form of dependency, which did exploit many countries that are still poor today. On the other hand there are a number of countries, such as Ethiopia and Thailand, that were never colonised, which are equally backward. Dependence takes more subtle forms, however, based on the international division of labour, for example, which then leads to unequal exchange relations between rich and poor with the poor dependent on the rich for capital and technical progress to equip their industrial sectors. The current indebtedness of the less developed countries, the 'increasing price' that poor countries have to pay for development inputs relative to the price they receive for their exports and the growing number of poor people are manifestations of this dependency. There are exceptions to the thesis of 'circular and cumulative causation', but it requires in most cases a strong exogenous shock to break out of a vicious circle of poverty and dependency. We take up some of these issues later in Part III of the book. Let us now turn our attention to the magnitude of poverty in developing countries and to the world distribution of income.

The Measurement of Poverty and the World Distribution of Income

By any standard one cares to take, the evidence is unequivocal that the world's income is distributed extremely unequally between nations and people, and that there exists in the world a broad north–south divide into rich and poor countries. The World Bank classifies the countries of the world into three broad categories: low-income countries; middle-income countries, and high-income countries. This classification for 1992 is given in **Table 1.2**. In later discussion, it is largely the low-income and middle-income countries that we shall refer to as the developing countries, and the high-income countries as the developed countries. There are several dimensions of the 'development gap', but focusing for the moment on income *per capita* and ignoring measurement difficulties, we see from column 3 that 37 countries are classified as low-income in a state of primary poverty with a weighted average level of income per head of only US $350 per annum. At the other end of the spectrum there are 24 high-income countries enjoying an average annual *per capita* income of close to US $20,000. This gives some idea of the range of income differences.

☐ *Poverty*

The World Bank defines poverty as the inability of people to attain a minimum standard of living.[1] This definition gives rise to three questions. How do we measure the standard of living? What is meant by a *minimum* standard of living? How can we express the overall extent of poverty in a single measure?

The most obvious measure of living standards is an individual's (or household's) real income or

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[1] The 1990 *World Development Report* published by the World Bank was devoted to a consideration of the measurement, magnitude and nature of poverty in the Third World.

Table 1.1 ***The Extent of Poverty in Developing Countries***

	Extremely poor			*Poor (including extremely poor)*			*Social indicators*		
Region	*Number (millions)*	*Headcount index (percent)*	*Poverty gap*	*Number (millions)*	*Headcount index (percent)*	*Poverty gap*	*Under 5 mortality (per thousand)*	*Life expectancy (years)*	*Net primary enrollment rate (percent)*
Sub-Saharan Africa	120	30	4	180	47	11	196	50	56
East Asia	120	9	0.4	280	20	1	96	67	96
China	80	8	1	210	20	3	58	69	93
South Asia	300	29	3	520	51	10	172	56	74
India	250	33	4	420	55	12	199	57	81
Eastern Europe	3	4	0.2	6	8	0.5	23	71	90
Middle East and North Africa	40	21	1	60	31	2	148	61	75
Latin America and the Caribbean	50	12	1	70	19	1	75	66	92
All developing countries	633	18	1	1116	33	3	121	62	83

Source: *World Development Report* 1990.

expenditure (with an allowance made for output produced for own consumption). The same level of real income and expenditure in different countries, however, may be associated with different levels of nutrition, life expectancy, infant mortality, levels of schooling etc. which must be considered as an integral part of 'the standard of living'. Measures of living standards based on *per capita* income, therefore, may need to be supplemented by other measures which include these other variables. We discuss later the attempt by the United Nations Development Programme (UNDP) to construct a Human Development Index which takes some of these factors into account.

To separate the poor from the not so poor, an arbitrary *per capita* income figure has to be taken which is sufficient to provide a minimum acceptable level of consumption. In theory, a consumption-based poverty line can be thought of as comprising two elements: firstly an objective measure of expenditure necessary to buy a minimum level of nutrition, and secondly a subjective additional amount that varies from country to country reflecting the cost of individuals participating in the everyday life of society. What is regarded as an acceptable standard of living in the United Kingdom will be different (and higher) from that regarded as acceptable in Nigeria. In practice, however, for the measurement of poverty in the Third World, the World Bank takes just two figures for *per capita* income: one to classify the total poor, the other to measure the extremely poor. In 1990, the figures taken were $370 per annum and $275 per annum, respectively.

Once the poverty line has been calculated, the simplest way to measure poverty is by the **head count index** which simply adds up the number of people who fall below the poverty line (sometimes expressed as a proportion of the population). By this measure, the World Bank calculated that the number of poor people in the developing countries is just over **one billion**, and the number of extremely poor is just over 600 million. The numbers by continent are shown in **Table 1.1.**

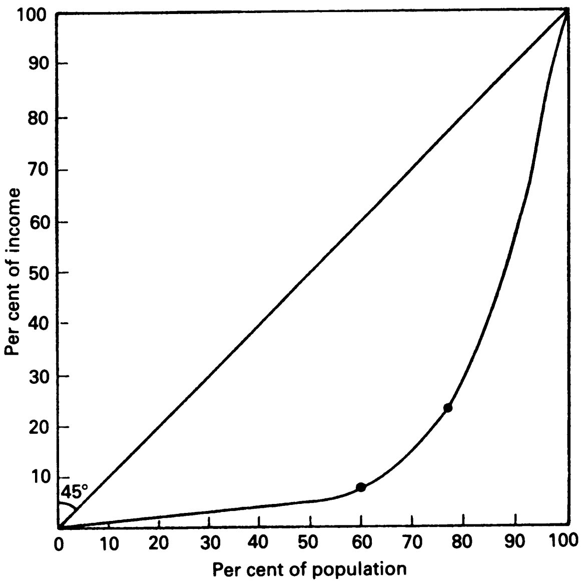
One weakness of the headcount index, however, is that it ignores the extent to which the poor fall below the poverty line, so that crude comparisons between countries, or over time, may be misleading. To overcome this weakness, the concept of the **poverty gap** may be used which measures the transfer of income required to bring the income of every poor person up to the poverty line. In **Table 1.1**, it is measured as the aggregate income shortfall of the poor as a percentage of aggregate consumption.

Both the headcount index and the poverty gap index are insensitive to the extent of inequality amongst the poor. For example, if income is transferred from a poor person to someone who is even poorer, neither of the measures changes, but poverty will be more evenly spread, and represent a social improvement in some sense. This consideration has implications for judging the claims of public policy because clearly if the headcount index is taken as the measure of poverty, the easiest way to reduce the head count index would be to focus all attention on those just below the poverty line, but this would not be socially just. We need measures of poverty which also take account of movements in the distribution of income between the poor.

It is interesting to note that despite the massive numbers of people in absolute poverty, the transfer needed to leave everybody above the poverty line ($370) is relatively small – only 3 per cent of total consumption in developing countries.

The focus of the World Bank is now very much on poverty eradication. In May 1992, the President of the World Bank, Mr Lewis Preston, declared that poverty reduction will be 'the benchmark by which our performances as a development institution will be measured'. This represents a shift of emphasis away from the Bank's traditional emphasis on project lending for economic efficiency to secure an economic rate of return from projects which may have done nothing to improve the lot of the poor.

Figure 1.1



□ *Distribution of World Income*

Turning now to the consideration of the distribution of world income in relation to the population, and using the three-fold classification of low-income, middle-income and industrial countries, we find that the low-income countries contain approximately 60 per cent of the world's population and receive only 6 per cent of the world's income; the middle-income countries contain 15 per cent of the world's population and receive 17 per cent of world income, and other rich industrialised countries contain 25 per cent of the world's population yet receive 77 per cent of world income. Income distribution data of this type (for individual countries as well as for groups of countries) can be represented graphically on a so-called **Lorenz curve diagram** as shown in **Figure 1.1.** The 45° line represents a perfectly equal distribution of income across the population. The bowed curve is the Lorenz curve showing graphically the degree of inequality. To draw the curve, first rank countries or groups of countries in ascending order according to the ratio of the percentage of income they receive in relation to the percentage population they contain; then cumulate the observations, and plot on the diagram. Taking the data given above, our ranking is obviously low-income, middle-income and 'high'-income. The cumulative distribution of income is 6/60 then 23/75 when the middle-income country figures are added to the first observation figures for the low-income countries, and 100/100 when the 'high'-income figures are added. Plotting these distributions gives the Lorenz curve shown. If historical data are available, changes in the distribution of income through time can be shown. It is possible, however, that two (or more) Lorenz curves may cross, precluding a definite conclusion on whether the distribution has narrowed or widened from a visual inspection of the curves alone. In this case a more precise measure of distribution is required. One measure is to express the area enclosed between the Lorenz curve and the 45° line as a ratio of the total area under the 45° line. This is the **Gini coefficient of distribution** which varies from 0 (complete equality) to 1 (complete inequality). Calculation of this ratio for the world economy would give a Gini coefficient of approximately 0.6.

There is little evidence that the distribution of world income has been narrowing over time. According to Kuznets (1965, pp. 142–75), if Lorenz curves are plotted for the years 1894, 1938 and 1949 there is no indication that the curves have been shifting closer to the 45° line. Andic and Peacock (1961) reach the same conclusion in a comparison of 1949 and 1957. Their estimate of the Gini ratio, taking 62 countries, is approximately the same for both years (0.637 and 0.636, respectively). What this suggests is that while *per capita* income may have been growing in the low-income countries, it must have been growing almost as fast in the high-income countries. This is certainly true of the period since 1965 as column 4 in **Table 1.2** indicates. Average *per capita* income growth in the developing countries has been 2.5 per cent, and 2.4 per cent in the developed countries.

It is easily forgotten that the rich–poor country divide is a relatively recent phenomenon. All countries were once at subsistence level, and as recently as 200 years ago, at the advent of the British industrial revolution, absolute differences in living standards between countries on average cannot have been great. The average *per capita* income of the developing countries today is approximately $1200 per annum and this was about the average level of real *per capita* income in Western Europe in the mid-nineteenth century measured at current prices. If we regard $1200 as only barely above subsistence, the major part of present income disparities between developed and developing countries must have arisen over the last century. Some countries, through a combination of fortune and design, have managed to grow much faster than others. The overriding influence has been industrialisation and the technological progress associated with it. The close association between industrialisation and living standards spells out the clear policy message that to base a development policy on agricultural activities *alone* would be misguided, however attractive such aphorisms as 'back to the land' and 'small is beautiful' may sound to those disillusioned with the recent industrialisation experience of the developing countries. Sutcliffe (1971) is right when he argues:

> It is understandable that vague memories of the oppression of the working class in 19th century Britain, the contemporary horrors of American machine-age society, and the Stalinist attack on the Russian peasantry, should arouse feelings which are hostile to industrialisation. Yet to oppose machines altogether, like Gandhi, or to argue that a long run rise in the standard of living is possible without industrialisation, are no more than forms of sentimentalism, especially when the condition of most of the population of the non-industrialised world is now both terrible and worsening. It is not sentimentalism to demand that the process of industrialisation should be made as humane and as painless as possible and that the long term aims of equality at a higher standard of living should be constantly borne in mind as the process goes on.

The concentrated impact of industrialisation on living standards in the Western world is dramatically emphasised by Patel's illustration (Patel (1964)) that if 6000 years of man's 'civilised' existence prior to 1850 is viewed as a day, the last century or so represents little more than half an hour; yet in this 'half-hour' more real output has been produced in the developed countries than in the preceding period. It is true that living stan-

Table 1.2 ***Basic Indicators***

			GNP per capita		*Average annual rate of inflation (percent)*		*Life expectancy birth (years)*
	Population (millions) mid-1990	*Area (thousands of square kilometers)*	*Dollars 1990*	*Average annual growth rate (percent) 1965–90*	*1965–80*	*1980–90*	*1990*
Low-income economies	**3 058.3 *t***	**37 780 *t***	**350 *w***	**2.9 *w***	**8.0 *w***	**9.6 *w***	**62 *w***
China and India	**1 983.2 *t***	**12 849 *t***	**360 *w***	**3.7 *w***	**3.2 *w***	**6.8 *w***	**65 *w***
Other low-income	**1 075.1 *t***	**24 931 *t***	**320 *w***	**1.7 *w***	**17.3 *w***	**15.1 *w***	**55 *w***
Mozambique	15.7	802	80	. .	. .	36.6	47
Tanzania	24.5	945	110	–0.2	9.6	25.8	48
Ethiopia	51.2	1 222	120	–0.2	3.4	2.1	48
Somalia	7.8	638	120	–0.1	10.2	49.7	48
Nepal	18.9	141	170	0.5	7.8	9.1	52
Chad	5.7	1 284	190	–1.1	6.2	1.2	47
Bhutan	1.4	47	190	. .	. .	8.4	49
Lao PDR	4.1	237	200	. .	. .	. .	49
Malawi	8.5	118	200	0.9	7.4	14.7	46
Bangladesh	106.7	144	210	0.7	15.9	9.6	52
Burundi	5.4	28	210	3.4	5.0	4.2	47
Zaire	37.3	2 345	220	–2.2	24.7	60.9	52
Uganda	16.3	236	220	–2.4	21.4	107.0	47
Madagascar	11.7	587	230	–1.9	7.7	17.1	51
Sierra Leone	4.1	72	240	0.0	7.9	56.1	42
Mali	8.5	1 240	270	1.7	9.0	3.0	48
Nigeria	115.5	924	290	0.1	14.6	17.7	52
Niger	7.7	1 267	310	–2.4	7.5	2.9	45
Rwanda	7.1	26	310	1.0	12.5	3.8	48
Burkina Faso	9.0	274	330	1.3	6.3	4.5	48
India	849.5	3 288	350	1.9	7.5	7.9	59
Benin	4.7	113	360	–0.1	7.4	1.9	50
China	1 133.7	9 561	370	5.8	–0.3	5.8	70
Haiti	6.5	28	370	0.2	7.3	7.2	54
Kenya	24.2	580	370	1.9	7.2	9.2	59
Pakistan	112.4	796	380	2.5	10.3	6.7	56
Ghana	14.9	239	390	–1.4	22.9	42.5	55
Central African Rep.	3.0	623	390	–0.5	8.2	5.4	49
Togo	3.6	57	410	–0.1	7.1	4.8	54
Zambia	8.1	753	420	–1.9	6.3	42.2	50
Guinea	5.7	246	440	. .	. .	. .	43
Sri Lanka	17.0	66	470	2.9	9.4	11.1	71
Mauritania	2.0	1 026	500	–0.6	7.6	9.0	47
Lesotho	1.8	30	530	4.9	6.7	12.7	56
Indonesia	178.2	1 905	570	4.5	35.5	8.4	62
Honduras	5.1	112	590	0.5	5.7	5.4	65
Egypt, Arab Rep.	52.1	1 001	600	4.1	6.4	11.8	60

Table 1.2 ***Basic Indicators*** **(*continued*)**

	Population (millions) mid-1990	Area (thousands of square kilometers)	GNP per capita		Average annual rate of inflation (percent)		Life expectancy birth (years)
			Dollars 1990	Average annual growth rate (percent) 1965–90	1965–80	1980–90	1990
Middle-income economies	**1 087.5 *t***	**41 139 *t***	**2 220 *w***	**2.2 *w***	**21.1 *w***	**85.6 *w***	**66 *w***
Lower-middle-income	**629.1 *t***	**22 432 *t***	**1 530 *w***	**1.5 *w***	**23.6 *w***	**64.8 *w***	**65 *w***
Bolivia	7.2	1 099	630	–0.7	15.9	317.9	60
Zimbabwe	9.8	391	640	0.7	5.8	10.8	61
Senegal	7.4	197	710	–0.6	6.3	6.7	47
Philippines	61.5	300	730	1.3	11.4	14.9	64
Côte d'Ivoire	11.9	322	750	0.5	9.4	2.3	55
Dominican Rep.	7.1	49	830	2.3	6.7	21.8	67
Papua New Guinea	3.9	463	860	0.1	8.1	5.3	55
Guatemala	9.2	109	900	0.7	7.1	14.6	63
Morocco	25.1	447	950	2.3	7.0	7.2	62
Cameroon	11.7	475	960	3.0	9.0	5.6	57
Ecuador	10.3	284	980	2.8	10.9	36.6	66
Syrian Arab Rep.	12.4	185	1 000	2.9	7.9	14.6	66
Congo	2.3	342	1 010	3.1	6.8	0.5	53
El Salvador	5.2	21	1 110	–0.4	7.0	17.2	64
Paraguay	4.3	407	1 110	4.6	9.3	24.4	67
Peru	21.7	1 285	1 160	–0.2	20.6	233.9	63
Jordan	3.2	89	1 240	. .	. .	. .	67
Colombia	32.3	1 139	1 260	2.3	17.5	24.8	69
Thailand	55.8	513	1 420	4.4	6.2	3.4	66
Tunisia	8.1	164	1 440	3.2	6.7	7.4	67
Jamaica	2.4	11	1 500	–1.3	12.8	18.3	73
Turkey	56.1	779	1 630	2.6	20.8	43.2	67
Romania	23.2	238	1 640	. .	. .	1.8	70
Poland	38.2	313	1 690	. .	. .	54.3	71
Panama	2.4	77	1 830	1.4	5.4	2.3	73
Costa Rica	2.8	51	1 900	1.4	11.2	23.5	75
Chile	13.2	757	1 940	0.4	129.9	20.5	72
Botswana	1.3	582	2 040	8.4	8.4	12.0	67
Algeria	25.1	2 382	2 060	2.1	10.9	6.6	65
Bulgaria	8.8	111	2 250	. .	. .	2.2	73
Mauritius	1.1	2	2 250	3.2	11.8	8.8	70
Malaysia	17.9	330	2 320	4.0	4.9	1.6	70
Argentina	32.3	2 767	2 370	–0.3	78.4	395.2	71
Iran, Islamic Rep.	55.8	1 648	2 490	0.1	15.5	13.5	63
Nicaragua	3.9	130	. .	–3.3	8.9	432.3	65
Upper-middle-income	**458.4 *t***	**18 706 *t***	**3 410 *w***	**2.8 *w***	**19.3 *w***	**102.1 *w***	**68 *w***
Mexico	86.2	1 958	2 490	2.8	13.0	70.3	70

Table 1.2 ***Basic Indicators*** **(*continued*)**

	Population (millions) mid-1990	*Area (thousands of square kilometers)*	*GNP per capita*		*Average annual rate of inflation (percent)*		*Life expectancy birth (years)*
			Dollars 1990	*Average annual growth rate (percent) 1965–90*	*1965–80*	*1980–90*	*1990*
South Africa	35.9	1 221	2 530	1.3	10.3	14.4	62
Venezuela	19.7	912	2 560	–1.0	10.4	19.3	70
Uruguay	3.1	177	2 560	0.8	58.2	61.4	73
Brazil	150.4	8 512	2 680	3.3	31.3	284.3	66
Hungary	10.6	93	2 780	. .	2.6	9.0	71
Yugoslavia	23.8	256	3 060	2.9	15.2	122.9	72
Czechoslovakia	15.7	128	3 140	. .	. .	1.9	72
Gabon	1.1	268	3 330	0.9	12.8	–1.7	53
Trinidad and Tobago	1.2	5	3 610	0.0	13.7	6.4	71
Portugal	10.4	92	4 900	3.0	11.7	18.1	75
Korea, Rep.	42.8	99	5 400	7.1	18.4	5.1	71
Greece	10.1	132	5 990	2.8	10.3	18.0	77
Saudi Arabia	14.9	2 150	7 050	2.6	17.9	–4.2	64
Libya	4.5	1 760	. .	3.0	15.4	–0.2	62
Oman	1.6	212	. .	6.4	19.9	. .	66
Low- and middle-income	**4 158.8 *t***	**78 919 *t***	**840 *w***	**2.5 *w***	**16.7 *w***	**61.8 *w***	**63 *w***
Sub-Saharan Africa	**495.2 *t***	**23 066 *t***	**340 *w***	**0.2 *w***	**11.4 *w***	**20.0 *w***	**51 *w***
East Asia & Pacific	**1 577.2 *t***	**15 572 *t***	**600 *w***	**5.3 *w***	**9.3 *w***	**6.0 *w***	**68 *w***
South Asia	**1 147.7 *t***	**5 158 *t***	**330 *w***	**1.9 *w***	**8.3 *w***	**8.0 *w***	**58 *w***
Europe	**200.3 *t***	**2 171 *t***	**2 400 *w***	. .	**13.9 *w***	**38.8 *w***	**70 *w***
Middle East & N. Africa	**256.4 *t***	**11 334 *t***	**1 790 *w***	**1.8 *w***	**13.6 *w***	**7.5 *w***	**61 *w***
Latin America & Caribbean	**433.1 *t***	**20 397 *t***	**2 180 *w***	**1.8 *w***	**31.4 *w***	**192.1 *w***	**68 *w***
Other economies	**320.9 *t***	**22 634 *t***	. .	. .	. .	. .	**71 *w***
Severely indebted	**455.2 *t***	**21 048 *t***	**2 140 *w***	**2.1 *w***	**27.4 *w***	**173.5 *w***	**67 *w***
High-income economies	**816.4 *t***	**31 790 *t***	**19 590 *w***	**2.4 *w***	**7.7 *w***	**4.5 *w***	**77 *w***
OECD members	**776.8 *t***	**31 243 *t***	**20 170 *w***	**2.4 *w***	**7.6 *w***	**4.2 *w***	**77 *w***
†Other	**39.6 *t***	**547 *t***	. .	. .	**13.8 *w***	**26.1 *w***	**75 *w***
Ireland	3.5	70	9 550	3.0	11.9	6.5	74
Israel	4.7	21	10 920	2.6	25.2	101.4	76
Spain	39.0	505	11 020	2.4	12.3	9.2	76
Singapore	3.0	1	11 160	6.5	5.1	1.7	74
Hong Kong	5.8	1	11 490	6.2	8.1	7.2	78
New Zealand	3.4	269	12 680	1.1	10.3	10.5	75
Belgium	10.0	31	15 540	2.6	6.6	4.4	76
United Kingdom	57.4	245	16 100	2.0	11.2	5.8	76
Italy	57.7	301	16 830	3.0	11.3	9.9	77
Australia	17.1	7 687	17 000	1.9	9.5	7.4	77
Netherlands	14.9	37	17 320	1.8	7.5	1.9	77
Austria	7.7	84	19 060	2.9	5.8	3.6	76

Table 1.2 ***Basic Indicators*** **(*continued*)**

			GNP per capita		*Average annual rate of inflation (percent)*		*Life expectancy birth (years)*
	Population (millions) mid-1990	*Area (thousands of square kilometers)*	*Dollars 1990*	*Average annual growth rate (percent) 1965–90*	*1965–80*	*1980–90*	*1990*
France	56.4	552	19 490	2.4	8.4	6.1	77
United Arab Emirates	1.6	84	19 860	. .	. .	1.1	72
Canada	26.5	9 976	20 470	2.7	7.1	4.4	77
United States	250.0	9 373	21 790	1.7	6.5	3.7	76
Denmark	5.1	43	22 080	2.1	9.3	5.6	75
Germany	79.5	357	22 320	2.4	5.2	2.7	76
Norway	4.2	324	23 120	3.4	7.7	5.5	77
Sweden	8.6	457	23 660	1.9	8.0	7.4	78
Japan	123.5	378	25 430	4.1	7.7	1.5	79
Finland	5.0	338	26 040	3.2	10.5	6.8	76
Switzerland	6.7	41	32 680	1.4	5.3	3.7	78
Kuwait	2.1	18	. .	–4.0	15.9	–2.7	74
World	**5 283.9 *t***	**133 342 *t***	**4 200 *w***	**1.5 *w***	**9.2 *w***	**14.7 *w***	**66 *w***

t means total.
w means weighted average.
Source: *World Development Report*, 1992.

dards in the developing countries have been rising faster since 1950 than at any time in the past; but so, too, have the living standards in the developed countries, and the gap between rich and poor countries continues to widen. Although development consists of more than a rise in *per capita* incomes, income disparities are the essence of the so-called 'development gap'. Let us examine the nature and magnitude of this gap more closely.

■ The Development Gap

The statement that 'the rich countries get richer and the poor countries get poorer' has become a popular cliché in the literature on world poverty, but without much discussion of the facts or the precise magnitude of the development task facing the developing countries if the *per capita* income gap between rich and poor nations is to be narrowed. Indeed, the statement itself is not unambiguous. Since living standards in all countries tend to rise absolutely over time, it obviously refers to the *comparative* position of poor countries, but is the comparative position being measured taking absolute or relative differences in *per capita* income? How should the 'development gap' be assessed? Unfortunately there is no easy answer to this question, yet the answer given has a profound bearing on the growth of *per capita* income that poor countries must achieve either to prevent a deterioration of their present comparative position or for an improvement to be registered. Relative differences will narrow as long as the *per capita* income growth rate of the developing countries exceeds that of the developed countries; and this excess of growth is a precondition for absolute differences to narrow and disappear in the long run. In the short run, however, a narrowing of relative differences may go hand in hand with a widening absolute difference, given a wide absolute gap to start with, and thus the rate of growth necessary to keep the absolute *per capita* income gap from widening is likely to be substantially greater than that required to keep the relative gap the same. But suppose the relative gap does narrow, and the absolute gap widens, are the poor countries comparatively better or worse off?

There is a tendency in economics to measure phenomena, especially dispersions of income, in relative rather than absolute terms – to compare differences in the rates of change of variables, as with Lorenz curves, rather than absolute differences. In comparing rich and poor countries, however, it is not difficult to argue that even if a relative *per capita* income gap is narrowed, the comparative position of the poor may have worsened because the absolute gap has widened. Take for illustration the case of the average Indian living on the equivalent of $350 per annum compared with the average American living on approximately $22 000. Suppose the Indian's income rises by 20 per cent and the American's income by 10 per cent. The Indian is now relatively better off, but is he not comparatively worse off? The American's increased command over goods and services (i.e. 10 per cent of $22 000) far exceeds that of the Indian (i.e. 20 per cent of $350), and unless marginal utilities differ radically, divergences in total utility and welfare will widen in favour of the American. On welfare grounds there would seem to be a case for paying as much attention to absolute differences in *per capita* income between rich and poor countries as to rates of growth of *per capita* income.

As it happens, both the absolute and the relative gap between rich and poor countries has widened in the last thirty years. Research by Dowrick (1992) shows that between 1960/64 and 1984/88, average *per capita* income growth in the rich countries was 2.49 per cent per annum; in the middle-income countries 2.16 per cent per annum, and in the poor countries 1.36 per cent per annum. There is no evidence of living standards converging in the world economy. In 1960, the richest 20 per cent of the world's population had incomes 30 times greater than the poorest 20 per cent of the world's population. In 1990, this ratio was 60 times greater. Taking account of income inequality within countries, the top 20 per cent of the richest people in the rich countries had incomes 150 times higher than the incomes of the poorest 20 per cent of people in poor countries.

Now let us turn to the *future* comparative position of the poor countries, and the magnitude of the development task as far as more equitable world living standards are concerned. To avoid the issue of whether strategy and assessment should be concerned with absolute or relative *per capita* income differences, and to facilitate quantification, matters will be made simple by assuming that the desirable goal is to narrow and eliminate both the absolute and the relative gap. We shall take as a target the average *per capita* income of the industrialised countries and attempt to answer four specific questions as reliably as the data will allow:

1. Given the recent growth experience of the poor countries, how long would it take for them to reach the current average level of *per capita* income in the industrialised countries?
2. Given the recent growth experience of the poor countries relative to the industrialised countries, how many years would it take for the *per capita* income gap to be eliminated?
3. Given the rate of growth of the industrialised countries from now until the year 2010 (say), how fast would the poor countries have to grow for *per capita* incomes to be equalised by that date?
4. Given the rate of growth of the industrialised countries, how fast would the poor countries have to grow merely to prevent the absolute *per capita* income gap between rich and poor countries from being any wider in the year 2010 than now?

By asking the first two questions some idea can be obtained of the time scale of the catching up process by the poor countries given their recent growth performance. The answers to the latter two questions give some idea of the growth task facing the poor countries in their struggle not only for parity of living standards, but also in simply preventing the absolute gap from widening.

Given the basic data, the answers to the questions posed involve little more than simple manipulation of the formula for compound interest:

$$S = P\,(1 + r)^n$$

where P is the principal sum and S is the sum to which the principal grows at an annual rate of growth, r, over n years. For illustration:

Let Y_{Dt} be the current level of *per capita* income in the industrialised countries = *\$20 000*;

Y_{DCt} be the current level of *per capita* income in the poor countries = *\$1200*;

r_D be the *per capita* income growth rate in the industrialised countries from 1990 to the year 2010 = 3 per cent (say);

r_{DC} be the actual *per capita* income growth rate in the poor countries = 2 per cent;

Y^*_D be the assumed level of *per capita* income in the industrialised countries in the year 2010 = *\$36 000* at today's prices (assuming 3 per cent growth);

and r^*_{DC} be the required *per capita* growth rate of the poor countries.

The solution to the first question is then obtained from the formula:

$$Y_{Dt} = Y_{DCt}(1 + r_{DC})^n$$

from which

$$n = \frac{\log \dfrac{Y_{Dt}}{Y_{DCt}}}{\log\,(1 + r_{DC})}$$

Applying the assumed values above gives:

$$n = \frac{\log \dfrac{20\,000}{1200}}{\log\,(1.02)} \simeq 95 \text{ years}$$

In other words, at a growth rate of 2 per cent, it would take the average poor country, with a *per capita* income of \$1200, 95 years to reach the *current* living standards enjoyed in the industrialised countries.

The solution to the second question is obtained from the expression:

$$Y_{Dt}(1 + r_D)^n = Y_{DCt}(1 + r_{DC})^n$$

from which we can find how long it would take (n) for the *per capita* income gap to be eliminated between rich and poor countries, as long as the rate of *per capita* income growth in poor countries is greater than in the industrialised countries – otherwise, of course, the absolute gap would widen for ever.

$$n = \frac{\log \dfrac{Y_{Dt}}{Y_{DCt}}}{\log(1 + r_{DC}) - \log(1 + r_D)}$$

A calculation can be made for any individual country whose average *per capita* income growth was in excess of that of the industrialised countries. Korea, for example, has a *per capita* income of approximately \$5000 and *per capita* income has been growing at approximately 7 per cent per annum. How long would it take Korea at this rate to catch up the present industrialised countries growing at 3 per cent? The answer is:

$$n = \frac{\log \dfrac{20\,000}{5000}}{\log(1.07) - \log(1.03)} = 36 \text{ years}$$

This is a relatively short space of time, but clearly the lower the initial level of *per capita* income and the smaller the excess of growth above 3 per cent, the longer the time it would take to catch up. For a country starting with an average level of *per capita* income of \$1000 and growing at 4 per cent, it would take 309 years!

The solution to the third question is obtained from the expression:

$$Y^*_D = Y_{DCt}(1 + r_{DC})^n$$

where Y^*_D is the assumed level of *per capita* income in the industrialised countries in the year 2010. We can then solve for the required growth rate of the poor countries between the base period (1990) and the year 2010($n = 20$) to equalise *per capita* incomes.

$$r^*_{DC} = n\sqrt{(Y^*_D/Y_{DCt})} - 1$$

Applying the assumed magnitudes of the variables gives:

$$r^*_{DC} = 20\sqrt{(36\,000/1200)} - 1$$
$$\simeq 18 \text{ per cent}$$

The required growth rate is 18 per cent per annum and hardly feasible. The magnitude of the development task is clearly colossal if defined in terms of achieving roughly comparable living standards throughout the world by the beginning of the next century. For most of the poor countries *per capita* income growth would have to increase six-fold, necessitating a ratio of investment to national income of 50 per cent or more. Investment ratios of this order are simply not feasible, and in any case the countries themselves could not absorb such investment.

The solution to the fourth question is obtained from the expression:

$$Y_{Dt} - Y_{DCt} = Y^*_D - Y_{DCt}(1 + r_{DC})^n$$

where the left-hand side represents the base level *per capita* income gap and n is 20 years. Solving for the growth rate that would have to be achieved to prevent the *present* gap from widening gives:

$$r_{DC} = n\sqrt{[Y^*_D - (Y_{Dt} - Y_{DCt})]/Y_{DCt}} - 1$$

Applying the assumed magnitudes of the variables gives:

$$r_{DC} = 20\sqrt{[36\,000 - (20\,000 - 1200)]/1200}$$
$$- 1 \simeq 14 \text{ per cent}$$

This again is a growth rate not feasible, with the implication that the *per capita* income gap between rich and poor countries will almost certainly be wider in the year 2010 than now, given the assumed 3 per cent average growth rate of the industrialised countries.

All the above calculations are sensitive to the assumed future growth rate of the industrialised countries, the choice of the target year in the future, and the base year level of *per capita* income taken for the poor countries. No one can possibly know with precision what the future rate of advance of the industrialised countries will be, and 3 per cent *per capita* income growth – the historical average from 1950 to 1990 – would seem to be as reasonable an assumption as any. But the lower the growth rate, the less formidable the growth effort of the poor countries to achieve parity of living standards. No special significance should be attached to the year 2010 as the choice of target year. Some year has to be taken to make these 'catching up' calculations – not too close to the present to give no hope and not too far away for the goal to be lost sight of. As far as the base year level of *per capita* income in the poor countries is concerned, a note of caution is in order. To the extent that income statistics invariably understate the value of production in poor countries (see later), the calculations of the catching-up time and the growth rate required for parity of living standards will be exaggerated. The degree of overestimation, however, is not likely to be so great as to invalidate the conclusion that the growth rates required for parity of living standards by the year 2010 are not feasible, and that on current growth performance some countries will never catch up. It can be argued, of course, that world income equality is an impracticable ideal, and that the primary aim is not equality of living standards throughout the world but 'tolerable' living standards in all countries, which is a very different matter. The problem is to define 'tolerable' living standards, and especially to guarantee a reasonably equitable distribution of that average level of real income. The time scale involved to reach 'tolerable' living standards is clearly less than that required to eliminate the gap entirely, but even so, if the average level of *per capita* income now enjoyed in the industrial countries is regarded as the tolerable level, we estimate it will take almost a century for the average poor country on current performance to attain it. Can these countries wait that long?

Per Capita Income as an Index of Development

Having considered the world distribution of income, and used *per capita* income figures as a measure of the 'development gap', we come now to the question of the use of *per capita* income figures as an index of development and for making a distinction between developed and developing countries, as well as between rich and poor. While there may be an association between poverty and underdevelopment and riches and development, there are a number of reasons why some care must be taken in using *per capita* income figures alone as a criterion of development (unless underdevelopment is *defined* as poverty and development as riches). Apart from the difficulties of measuring income in many countries and the difficulties of making inter-country comparisons, which will be considered in the next section, a single *per capita* income figure to divide developed from developing countries must inevitably be somewhat arbitrary, ignoring such factors as the distribution of income within countries, differences in development potential and other physical indicators of the quality of life. It is not so much a question of whether or not low-income countries should be labelled 'underdeveloped' or 'developing', but what income level should be used as the criterion for separating the developed from the developing countries, and whether all high-income countries should be labelled 'developed'. In many ways it should be the nature and characteristics of the countries that decide the income level which is used as the dividing line. It also makes sense to categorise separately the oil rich countries which have high *per capita* incomes but by no stretch of the imagination can be regarded as developed. Within the countries outside the industrialised bloc, the *per capita* income level dividing the low and middle-income countries is arbitrary, but none are fully industrialised and all are developing in this sense. Acronyms abound to describe the different stages of development. Perhaps the most amusing set is attributable to the Brazilian economist, Roberto Campos, who distinguishes five categories of countries: the HICs, PICs, NICs, MICs and DICs. These stand for hardly industrialised countries, partly industrialised countries, newly industrialised countries, mature industrialised countries and decadent industrialised countries! The HICs and the PICs would certainly cover all the low-income countries and at least the lower half of the middle-income countries. The NICs cover most of the latter half of the middle-income countries – Brazil, Mexico, Hong Kong, Singapore being prime examples. The MICs and DICs cover most of those countries classified as industrial market economies with the exception of Ireland, New Zealand and Australia which have become rich through agriculture. The United Kingdom is a prime example of a DIC which has lost over four million jobs in manufacturing industry since 1966.

Because of the arbitrariness and potential deficiencies of *per capita* income as a measure of development, other criteria are often suggested. We have already mentioned the level of industrialisation as one. Another might be an index of the quality of life based on such indices as the level of infant mortality; life expectancy; literacy and food consumption per head. Furtado (1964, pp. 141–3) has attempted a structural definition of underdevelopment which stresses imbalances between factors of production, and factor underutilisation: '**Underdevelopment is a state of factor imbalance reflecting a lack of adjustment between the availability of factors and the technology of their use, so that it is impossible to achieve full utilisation of both capital and labour simultaneously**'. An underdeveloped structure is therefore a situation in which 'full utilisation of available capital is not a sufficient condition for complete absorption of the working force at a level of productivity corresponding to the technology prevailing in the dynamic sector of the system'. By this criterion, Kuwait is obviously not a developed country, and Australia and Canada may be classified as totally developed even though they have underutilised natural resources and great development potential. But bearing in mind the arbitrariness of *per capita* income, it is still very convenient to have one readily available, and easily understandable, criterion for classifying countries, and perhaps *per capita* income is the best single index we have. It also has one positive advantage, namely that it focuses on the *raison d'être* of development, which is the raising of living standards and the eradication of poverty. And in the last resort *per capita* income is not a bad proxy for the social and economic structure of societies. If developing countries are defined on the basis of a *per capita* income level so as to include most of the countries of Asia, Africa and South America, striking similarities are found between the characteristics and development obstacles of many of the countries in these continents. These characteristics include a high proportion of the labour force engaged in agriculture and low agricultural productivity, a high proportion of domestic expenditure on food and necessities; an export trade dominated by primary products and an import trade dominated by manufactured goods; a low level of technology; high birth rates coupled with falling death rates; and savings undertaken by a small percentage of the population. There may, of course, be some countries which on a *per capita* income basis are classified as developed and which possess most of the above-mentioned characteristics, but the exceptions will be few, and the reverse of this situation is almost inconceivable. Also these countries have many social problems in common, such as growing unemployment in urban areas; inegalitarian income distributions, and poor health and standards of education – about which we shall say more later. In general, therefore, we conclude that *per capita* income may be used as a starting-point for classifying *levels* of development, and can certainly be used for identifying the *need* for development. The only major reservation that we shall have to make later concerns the case of geographically dual economies where an aggregate *per capita* income figure can disguise the need for the development of a sizeable region as great as the need for the development of a country itself, e.g. southern Italy.

It should be emphasised that we are not at this stage implying any causal relation between the characteristics of low-income countries and the extent of their poverty or underdevelopment. Low *per capita* incomes do seem to go hand in hand with such characteristics as high birth rates and an absence of industry, but it is always dangerous to equate association with causation, and in this context what is cause and what is effect cannot be deduced without adequate theorising. As Kuznets (1961, p. 9) reminds us, 'it is easy to translate close statistical association into significant causal relationships . . . [but] in view of the continuous interplay of income levels and these associated characteristics this simple translation is a logical trap that should be avoided lest it lead to intellectual sterility and to a dangerously mechanistic approach to policy implications'. A simple mechanical argument ascribing poverty to such factors as low savings and primary product production ignores the fact that countries may be at different stages of their economic history and may differ radically with respect to past history and future prospects. In this respect, four main categories of low-income countries need distinguishing: first, those countries with low *per capita* incomes but which are progressing rapidly and with enormous future potential based on indigenous resources; second, those countries with rising *per capita* incomes but with less hope of rapid self-sustaining growth because of resource limitations; third, those countries rich in resources but with *per capita* income still relatively stagnant; and last, those countries with a stationary *per capita* income and with little prospect of raising living standards owing to a sheer lack of resources. A low-income country may fall into any one of these four broad categories and it would clearly be misleading, without further information, to ascribe low *per capita* income in a particular country at any particular point in time to characteristics it shares with other low-income countries. Association between low incomes and certain development characteristics is all that one is really entitled to claim.

There is a difference, however, between using *per capita* income as a guideline for classifying countries into developed and underdeveloped at a point *in time* and using the growth of *per capita* income as an index of development *over time*. The difficulty of using *per capita* income for the latter purpose is the obvious one that if, in a particular period, *per capita* income did not grow because population growth matched the growth of a country's total income, one would be forced into the odd position of denying that a country had developed even though its national product had increased. This is an inherent weakness of linking the concept of development to a measure of living standards.

This leads on to the **distinction between growth and development.** Development without growth is hardly conceivable, but is growth possible without development? If *per capita* income is rejected as an index of development over time, an answer to this question is not possible without defining terms more precisely.

The difficulty is defining 'development'. The meaning of 'growth' is fairly unambiguous; most economists would accept the definition of a rise in *real* national income, i.e. a rise in money income deflated by an index of prices. **But 'development' is an elusive term meaning different things to different groups of social scientists.**[1] Most would agree that development implies more than just a rise in real national income; that it must be a sustained, secular rise in real income accompanied by changes in social attitudes and customs which have in the past impeded economic advance (see our earlier discussion). But at this point agreement on what constitutes development would probably end. But whatever definition of development is given, growth is clearly possible without the broader societal changes referred to. The upswing of the trade cycle is the most obvious example of the possibility of growth without development, and examples of abortive 'take-offs' are not hard to find where countries have grown rapidly for a short time and then reverted to relative stagnation. Historically, Argentina is a case in point. On the other hand, development is hardly possible without growth; but development is possible, as we have suggested, without *per capita* income rising. It would be a strange, rather purposeless, type of development, however, which left *per capita* income unchanged, unless the stationary *per capita* income was only temporary and a strong foundation was being laid for progress in the future. For the ultimate rationale of development must be to improve living standards and welfare, and while an increase in measured *per capita* income may not be a sufficient condition for an increase in individual welfare, it is a necessary condition in the absence of radical institutional innovations, such as the distribution of 'free' goods.

An increase in income is not a sufficient condition for an increase in welfare, because an increase in income can involve costs as well as benefits. It may have been generated at the expense of leisure or by the production of goods not immediately consumable. **If development is looked upon as a means of improving the welfare of present generations, probably the best index to take would be consumption per man-hour worked.** This index, in contrast to an index of *per capita* income, focuses directly on the immediate utility derivable from consumption goods in relation to the disutility of work effort involved in their production.

The Measurement and Comparability of *Per Capita* Incomes

We turn now to the difficulties of measuring real *per capita* income and comparing living standards between countries. These difficulties cannot be ignored any longer and must be continually borne in mind in using *per capita* income figures both for classification purposes and for comparing the rate of development in different countries over time. The difficulties of obtaining meaningful and accurate measures of real *per capita* income relate more to the measurement of real income than to population, and we shall thus concentrate briefly on some of the problems of national income accounting and the uses of national income statistics in developing countries.

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[1] For semantic entertainment on the meaning of 'development' and 'underdevelopment', see Machlup (1967). Machlup himself defines economic development as 'those changes in the use of resources that result in potentially continuing growth of national income per head in a society with increasing or stable population'.

The first point to bear in mind is that if no allowance is made for the non-monetary sector in the national income accounts of a developing country, any long-term growth estimates are bound to have an upward bias owing to the gradual extension of the money economy and the shift of economic activities from the household to the market-place. Furthermore, if no allowance is made for the subsistence sector in some countries, it may be misleading to compare periods in these countries' history and to compare growth rates between countries, especially between the developed and the developing countries.

Growth rates may also be biased upwards by using prices as weights in compiling national income totals from the output statistics of different sectors of the economy (unless the weights are revised frequently), since goods with high prices, which subsequently fall, are usually the fastest growing. This is more of a danger in developing countries than in developed countries because of less sophisticated accounting techniques, the greater difficulty in revising price weights, and the more widespread introduction of new goods with high initial prices.

A consideration of prices is also necessary in deciding what price index to use as a deflator of money national income in order to obtain an index of real income. The task of converting money income statistics into real income raises all the difficulties, not peculiar to developing countries, connected with the use of index numbers, such as which base year should be taken, how to take account of changes in the quality of products, which weighting system to employ, and so on. These are conceptual issues to be sorted out by the national income statistician rather than by the development economist, but it is important for the economist to know how figures for real national income, or *per capita* income, have been arrived at prior to analysis.

But apart from the problem of bias and the choice of price deflator there is the sheer practical difficulty of measuring money national income in a rural economy where communications are bad, illiteracy rife, and in which many goods produced and consumed do not exchange for money. Differences in the extent of the subsistence economy between developing countries, and differences in the ease and difficulty of collecting data, may markedly influence estimates of national income, and therefore of *per capita* income differences, between these countries and the rest of the world. Some testimony to the role that the subsistence sector must play in the economies of most developing countries is illustrated by the inconceivability that 60 per cent of the world's population could remain alive on the equivalent of $1200 per annum. But this is not the whole story.

The other part of the story, and probably the major part, concerns the understatement of living standards in developing countries when their national incomes measured in local currencies are converted into US dollars (as the common unit of account) at the official rate of exchange. If the US dollar is used as the unit of account the national income per head of country *X* in US dollars is given by

$$\frac{\mathrm{GNP}_X}{\text{Population}} \div \text{Exchange rate}$$

For example, if the GNP of country *X* is 100 million rupees, its population is 5 million, and there are 10 rupees to the dollar, then *per capita* income of country *X* in dollars is:

$$\frac{100}{5} \div 10 = \$2.$$

But if living standards between two countries are to be compared by this method, it must be assumed that 10 rupees in country *X* can buy the same living standard as $1 in the United States. It is well known, however, that official exchange rates between two countries' currencies are not very good measures of **purchasing-power parity** between countries, especially between countries at different levels of development. The reason is this: exchange rates are largely determined by the supply and demand for currencies based on goods which are traded, the prices of which tend to be equalised internationally. Purchasing-power parity, however, depends not only on the price of traded goods, but also on the price of non-traded goods which is largely determined by unit labour costs, which tend to be lower the poorer the country. In general, therefore, the lower the level of development the lower the ratio of the price of non-traded goods to traded goods and the more the use of the official exchange rate will understate the living standards of the developing country measured in US dollars. The ratio of the price of non-traded goods to traded-goods tends to rise with development as wage levels in the non-traded goods sector rise while productivity growth is relatively slow, and slower than in the traded goods sector. **To make meaningful international comparisons of income and living standards, therefore, what is required is a measure of purchasing-power parity, or a *real* exchange rate, between countries.**

There are several methods of constructing purchasing-power parity ratios in order to make binary comparisons (one country with another) or 'multilateral' comparisons in which the currency of any one of a group of countries can act as the unit of account without altering the ratios of living standards between countries.

One approach to the construction of a purchasing-power parity ratio between two countries is to revalue the national incomes of the two countries by selecting a comparable basket of goods and services in each country and estimating the purchasing-power equivalent of each item in country A relative to country B. Thus if P_{ia} is the price of item i in country A and P_{ib} is the price of item i in country B, the purchasing-power equivalent of item i in country A relative to country B is P_{ia}/P_{ib}. By extending this calculation to all goods, and applying the price ratios to the average quantities consumed of each item in the two countries, we obtain a formula for the over-all purchasing-power equivalent in country A relative to country B:

$$\frac{\sum_i Q_i P_{ia}}{\sum_i Q_i P_{ib}}$$

where Q_i is the geometric mean of the quantities of each good consumed in the two countries.

The purchasing-power-equivalent ratio can then be used to convert one country's national income measured in local currency into another country's currency as the unit of account (e.g. the US dollar). For example, suppose that the official exchange rate between the Indian rupee and the US dollar is 10 : 1, while the purchasing-power-equivalent ratio is 5 : 1. This means that converting the Indian national income into US dollars at the purchasing-power parity rate will give double the income than the conversion at the official exchange rate.

The method described above is only one possible approach to the construction of a binary purchasing-power parity ratio. Instead of the relative prices being applied to the geometric average of the quantities of each good consumed in the two countries, the quantity weights could be the quantities consumed in either the one country or the other. If the quantity weights of the poor country are used, the dollar valuation of the poor country's income would probably be even higher because relatively large weights would be given to those items which are widely consumed in those countries with low relative prices, therefore improving the purchasing-power parity ratio.

Alternatively comparisons can be made from the output side by valuing output in both countries either at one country's prices or at the other's prices.

The results of constructing and using purchasing-power parity ratios for making binary comparisons have been quite dramatic. In an early study, Millikan suggested that the real incomes of many African and Asian countries in 1950 were of the order of 350 per cent larger than indicated by UN statistics in US dollars *per capita* (Kindleberger (1965), p. 9). Likewise, Usher (1966, pp. 10–17) estimated the ratio of British to Thai national income per head to be 13.06 : 1 converting Thai income in local currency into pounds at the foreign exchange rate. However, by-passing the exchange rate and valuing British and Thai income directly at Thai prices the ratio fell to 6.27 : 1, and valuing both incomes at British prices the ratio fell

Table 1.3 ***Per Capita GDP in 1970 in $US Using Official Exchange Rates and in International $s Using International Prices***

	Per capita GDP (1970) in $US at official exchange rates	*Per capita GDP (1970) in I$ at international prices*
Colombia	329	763
France	2902	3599
West Germany	3080	3585
Hungary	1037	1935
India	98	342
Italy	1699	2198
Japan	2003	2952
Kenya	144	275
United Kingdom	2143	2895
United States	4801	4801

to 2.76 : 1. In making binary international comparisons of *per capita* incomes, therefore, it makes a great deal of difference whether the official foreign-exchange rate is used as a measure of purchasing-power parity, or, if the use of exchange rates is discarded, which quantity weights are applied to relative price indices or which price weights are applied to relative quantities.

More recently, Irving Kravis and collaborators have developed a method of making **multilateral** comparisons of real *per capita* incomes across countries by constructing world price ratios based on price and quantity data for over 100 commodity categories in over 100 countries. The international prices are then used to value quantities in each of the countries. The international prices and product values are expressed in international dollars (I$). An international dollar has the same overall purchasing power as a US dollar for national income as a whole, but relative prices for each country are relative to average world prices rather than relative to US prices. This multilateral approach allows a direct comparison between any two countries using any country's currency as the unit of account. The results of this exercise for ten countries originally taken by Kravis *et al.* ((1975); see also Kravis *et al.* (1978)) are summarised in **Table 1.3**. It can be readily seen that converting some of the poor countries' incomes at international prices rather than at official exchange rates increases the estimate of *per capita* income more than two-fold (e.g. in the case of Colombia and India).

Purchasing power parities can be derived from the table in the following manner. The purchasing power parity rate (PPPR) is equal to the official exchange rate divided by the extent to which the official exchange rate conversion of *per capita* income understates the true level of *per capita* income when measured at international prices. Suppose, for example, there are 7 Kenyan shillings to one US dollar, and that the official exchange rate conversion understates Kenyan *per capita* income by 90 per cent (which it does according to **Table 1.3**). The PPPR of Kenyan shillings to $US is therefore PPPR = 7/1.9 = 3.7. That is, to compare living standards between Kenya and the US, the real exchange rate of 3.7 ought to be used, not the official rate of 7 shillings to the dollar.

The pioneer work of Kravis is now regularly extended and updated by his collaborators, Summers and Heston, who produce international comparisons of price levels and real *per capita* incomes at international prices for all major countries in the world since 1950, which can be compared with the World Bank estimates of *per capita* incomes based on official rates of exchange with the US dollar (see, for example, Summers and Heston (1988)).

Before ending this section it should be stressed that purchasing-power parity ratios, however derived, should not be interpreted as equilibrium exchange rates to be used as a standard for measuring the extent to which the official exchange rate may be either under- or over-valued. As we have said before, exchange rates are determined by the supply of and demand for traded goods, while many goods not traded figure in the purchasing-power parity ratios.

Apart from the construction of purchasing-power parity ratios there have been several other attempts to overcome the problems of using suspect income statistics to compare living standards between countries and over time. One consists of the use of non-monetary indicators, such as levels of health and education, the number of cars per head, steel production, etc., and to rank countries according to an index of each indicator (United States = 100). The indices of all indicators are then averaged. However, this approach suffers from the drawback that there is no satisfactory weighting system that can be used for combining the different indices. An alternative approach has been suggested by Beckerman and Bacon (1966) which they claim to be 'theoretically valid, potentially very accurate, and at the same time, almost costless'. The approach is based on correlation and regression analysis. Their procedure is as follows. First, they take *reliable* estimates of relative (to the United States) real consumption per head for thirteen countries. Then they take several non-monetary indicators and pick out those that correlate best with the reliable observations of real consumption per head, experimenting with different functional forms. Finally, with the aid of a computer they find which combination of indicators, and which forms of the equations linking them to real consumption per head, give the best results in terms of the multiple correlation coefficients and the standard errors of the regression equations. From the best results, predictions can be made of relative consumption per head for countries, where data on income per head are thought to be unreliable, from the non-monetary independent variables. The variables used as predictors were as follows: annual crude steel consumption per head; annual cement production per head; annual number of domestic letters sent per head; stock of radio receivers per head; stock of telephones per head; stock of road vehicles per head; and annual meat consumption per head. Predictions are made by Beckerman and Bacon for eighty countries, and the countries ranked. Unfortunately there is no indication given of the extent to which the ranking of countries by this method differs from the ranking by published *per capita* income statistics. If the rankings differ substantially, it may be that the Beckerman–Bacon approach is the most appropriate to adopt for obtaining a measure of comparative levels of welfare between countries as measured by consumption per head. If the rankings do not differ markedly, income per head may still be regarded as a good proxy for the comparison of living standards. (This is the conclusion of Hagen and Hawrylyshyn (1969).)

Other Dimensions of the Development Gap

The human problems of developing countries are not confined to low levels of *per capita* income. Developing countries generally experience much higher levels of unemployment – open and disguised – than do developed countries; their income distributions tend to be much more inegalitarian, and the levels of health, nutrition and education are often abysmally low. Policy in developing countries is becoming increasingly concerned with these other dimensions of the development gap. The growth of *per capita* income has never been the sole objective of development policy but more attention is now being paid to other objectives which in some instances may conflict with growth of *per capita* income.

Unemployment

Open unemployment in the urban areas of developing countries is another dimension of the development problem, and an increasingly serious one. The reduction of unemployment has become a major policy priority of governments and inter-

Table 1.4 ***Unemployment Rates in Selected Developing Countries***

	Percentage of labour force					
	1965	*1970*	*1975*	*1980*	*1981*	*1982*
Africa:						
Egypt	1.9[a]	2.4	2.5	5.2	–	–
Middle East:						
Syria	7.4	6.4	4.8	3.8[b]	–	–
Asia:						
S. Korea	7.4	4.5	4.1	5.2	4.6	4.4
Philippines	8.2	6.0	4.4	4.8	5.1	5.3
Latin America and Caribbean:						
Argentina	5.3	4.8	2.3	2.3	4.5	5.7
Chile[c]	5.4	4.1	15.0	10.4	11.3	20.0
Colombia[d]	8.9	8.2	10.5	9.9	8.1	–
Panama	7.6	7.1	6.4	8.8[e]	–	–
Peru[f]	–	4.7	4.9	7.0	6.8	7.0
Trinidad and Tobago	14.0	12.5	15.0	10.0	12.2	–
Uruguay[g]	7.2[h]	7.5	8.1[i]	7.3	6.6	–
Venezuela[j]	7.7[k]	6.3	7.6[l]	6.0	6.2	7.1

[a] 1964, [b] 1979, [c] Gran Santiago, [d] Bogota, [e] 1979, [f] Lima Callao, [g] Montevideo, [h] 1967, [i] 1974, [j] urban, [k] 1967, [l] 1976.
Source: M. Godfrey, *Global Unemployment: The New Challenge to Economic Theory* (Brighton: Wheatsheaf Books, 1986).

national agencies concerned with developing countries. Poor countries for a long time, and particularly since the population explosion, have been characterised by underemployment, or disguised unemployment (see Chapter 3), on the land. What has happened in recent years is that disguised unemployment on the land has transferred itself into open unemployment in the towns. The reasons for this, and the rationale for migration, will be considered later, but first let us outline the facts. Some idea of the seriousness of unemployment is given by the figures in **Table 1.4** for a selection of developing countries. The figures are not so different from unemployment rates recorded in some developed countries in the 1980s, but the recorded figures measure only the tip of the iceberg.

There are a number of contributory factors to the emergence of unemployment in the towns on an increasing scale. The problem is not so much one of a deficiency of demand for labour in an aggregate demand sense. The causal factors relate to the incentives to labour migration from the rural to the urban areas, and the incapacity of the urban areas to provide employment owing to a lack of co-operating factors of production to work with labour: capital in particular. As far as migration is concerned, there are both push and pull factors at work. The **push factors** have to do with the limited job opportunities in rural areas, and the greater willingness and desire to move fostered by education and the improvements in communications. The pull factors relate to the development of industrial activities in the towns offering jobs at a higher real wage than can be earned in rural areas, so that even if a migrant is unemployed for part of the year, he may still be better off migrating to the town than working in the rural sector. If there is no work at all in the rural sector, the migrant loses nothing, except perhaps the security of the extended family system. The rate of growth of job opportunities in the rural sector depends on the rate of growth of demand for the output of the rural sector and the rate at which jobs are being 'destroyed' by productivity growth.[1] The growth of demand for the output of the rural sector will be equal to the rate of growth of total population plus the rate of growth of *per capita* income multiplied by the income elasticity of demand for rural output. Suppose population is growing at 2 per cent, that *per capita* income is growing at 4 per cent and that the income elasticity of demand is 0.5, then the rate of growth of demand for the rural sector's output will be 2.0 + 0.5 (4.0) = 4.0 per cent. Now suppose that the rural sector's productivity is growing at 2 per cent. The rate of growth of demand for labour will then be the difference between 4 per cent and 2 per cent, i.e. 2 per cent. If the rural-sector labour force is growing at 3 per cent, then 1 per cent of the labour force will be becoming redundant annually. If the level of disguised unemployment in the rural sector were not to increase, this figure would constitute the potential volume of migrants. If the urban labour force is only one-fifth of the size of the rural labour force, a 1 per cent migration of rural labour would represent a 5 per cent increase in the urban labour force due to migration. On average, this is about the extent of the influx from the rural sector into the urban areas of developing countries. On top of this there is the natural increase in the work-force in the urban area to consider; this is of the order of between 2 and 3 per cent. If job opportunities in the urban areas are only increasing at 5 per cent, then 2 to 3 per cent of the urban labour force will become unemployed annually, thus raising the unemployment percentage year by year.

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[1] i.e. since $O = L(O/L)$, then $dL/L = dO/O - d(O/L)/(O/L)$, where L is employment, O is output and O/L is labour productivity.

Historically, the process of development has always been associated with, and characterised by, an exodus from the land, continuing over centuries. The uniqueness of the present situation is not the migration itself but its magnitude and speed. And the problem is that the urban sector cannot absorb the numbers involved. For any given technology the rate at which the urban (industrial) sector can absorb migrants largely depends on the rate of capital formation. If labour and capital must be combined in fixed proportions, and the rate of capital accumulation is only 5 per cent, then the rate of increase in job opportunities can be only 5 per cent also. Unfortunately, however, as we shall show in Chapter 3, the problem is not necessarily solved by a faster rate of capital accumulation in the urban sector, because migration is not simply a function of the actual difference in real remuneration between the two sectors, but also of the level of job opportunities in the urban sector. If the rate of job creation increases, this may merely increase the flow of migrants with no reduction in unemployment. The solution would seem to be to create more job opportunities in the rural sector. This will require, however, not only the redirection of investment but also the extension of education and transport facilities, which in the past few years have themselves become powerful push factors in the migration process. Whereas formerly redundant labour might have remained underemployed on the family farm, nowadays education and easy transportation provide the incentive and the means to seek alternative employment opportunities. While education and improved communications are desirable in themselves, and facilitate development, their provision has augmented the flow of migrants from rural to urban areas.

The **pull factors** behind migration are not hard to identify. The opportunities for work and leisure provided by the industrial, urban environment contrast sharply with the conservatism and stultifying atmosphere of rural village life and act naturally as a magnet for those on low incomes or without work, especially the young. Given the much higher wage in the urban sector, even the prospect of long spells of unemployment in the urban area does not detract from the incentive to migrate. Moreover, the choice is not necessarily between remaining in the rural sector and migrating to the urban sector with the prospect of long periods of unemployment. The unemployed in the urban sector can often find work, or create work for themselves, on the fringes of the industrial sector – in particular in the informal service sector of the industrial economy. The wages may be low, but some income is better than no income. In other words, unemployment in urban areas may take the form of underemployment, or become disguised, just as in the case of the rural sector – its manifestation being low income. This has led to the notion of an **income measure of unemployment** which needs to be added to registered unemployment to obtain a true measure of unemployment and the availability of labour supply.

One way of measuring the extent of unemployment disguised in the form of low-productivity/low-income jobs is to take the difference between the actual labour employed at the sub-standard income and the labour that would be required to produce a given level of output or service at an acceptable level of income per head. Before measurement took place, of course, the acceptable (standard) level of income would have to be defined. It could be that level set as the 'poverty line', below which health and welfare become seriously impaired. The income measure of unemployment would thus be:

$$U = L - L^* = \frac{O}{O/L} - \frac{O}{O/L^*}$$

where L is the actual labour employed, L^* is the labour consistent with an acceptable level of income per person employed, O/L is the actual level of productivity, O/L^* is the acceptable level of income per employed person, and O is output.

Let us work an example. Suppose that the annual flow of output of an activity or service is £1 million and that the existing number employed is 10 000, giving a level of productivity of £100. Now suppose that the acceptable level of productivity to produce an acceptable level of income per person employed is £200. The income measure of unemployment is then:

$$U = \frac{1\,000\,000}{100} - \frac{1\,000\,000}{200} = 5000$$

that is, one-half of the existing labour force is disguisedly unemployed in the sense that the level of output is not sufficient to maintain all those who currently work at an adequate standard of living.

Such has been the concern in recent years with employment and unemployment in developing countries that the International Labour Office launched in 1969 a World Employment Programme sponsoring missions to several countries to undertake detailed diagnosis of the employment problem. Some of the major findings and conclusions have been surveyed by Thorbecke (1973). The report on Colombia estimated that an employment growth rate of 7 per cent per annum would be required to absorb all increases in the labour force. Since the projected rate of growth of labour productivity would make this impossible, the report recommended a move to more labour-intensive techniques, at least in the industrial sector. The report on Kenya emphasised the income measure of unemployment discussed above. It drew attention to the large number of people forced to work in the informal sector of the industrial sector with extremely low productivity, such that income falls below an acceptable minimum. Visible (open) unemployment was estimated at between 8 and 14 per cent. Adding low-income workers in the manner described above, the percentage rises to 20 per cent for males and 50 per cent for females. The report on Iran gave priority to population control (which we discuss in Chapter 6) but, as it reputably said in the draft of the report, the population problem cannot be solved overnight! The report on Sri Lanka is distinctive for its thorough analysis of structural unemployment. There are three main types of structural imbalance in most developing countries which affect employment. One is between skills, attitudes and expectations on the one hand and opportunities on the other. This affects mainly educated people. Second, there is imbalance between regions. Third, there is the sheer lack of co-operating factors for labour to work with, particularly capital and skilled managerial enterprise. We take up some of these difficulties in later chapters.

■ The Distribution of Income

The average level of *per capita* income in the developing countries has increased fairly substantially over the last two decades, as **Table 1.2** shows, yet the evidence suggests that growth and development in many countries has left the vast mass of people untouched. The growth that has taken place has served largely to benefit the few – the richest 20 per cent of the population. Rural and urban poverty are still widespread, and if anything the degree of income inequality within the developing countries has increased. It should not come as a surprise, however, that the transformation of economies from a primitive subsistence state into industrial societies, within a basically capitalist framework, should be accompanied in the early stages by widening disparities in the personal distribution of income. Some people are more industrious than others, and more adept at accumulating wealth than others. Opportunities cannot, in the very nature of things, be equal for all. In the absence of strong redistributive taxation, income inequality will inevitably accompany industrialisation because of the inequality of skills and wealth that differences in individual ability and initiative, and industrialisation, produce.

The evidence for individual countries suggests, however, that income inequality ceases to increase at quite low levels of *per capita* income – at about $300 per annum at 1965 prices, or at about $1500 at 1992 prices. Beyond this level, income inequality tends to decrease as industrialisation proceeds. Kuznets's work (1955, 1963) shows that in many of the present developed countries, the extent of inequality decreased in the later stages of industrialisation, and certainly the degree of inequality in the developing countries is greater than in the present developed countries, largely as a result of the heavy concentration of income among the top 5 to 10 per cent of income recipients. The work of Kravis (1960) also shows that the degree of inequality first increases within countries and then declines.

The most comprehensive data assembled to date are those by Adelman and Morris (1971), and extended by Paukert (1973), which show the size distribution for fifty-six countries, developed and developing (see **Table 1.5**). The table also shows two measures of income concentration calculated from these figures – the Gini coefficient and the maximum equalisation percentage, which indicates what percentage of total income would have to be shifted between the quintiles of income recipients in order to achieve an equal distribution of income. The data show fairly conclusively that inequality increases up to a certain stage of development and then declines, tracing out an inverted U-shape similar to the pioneer work of Kuznets for the now developed countries. The average Gini coefficient for forty-three developing countries is 0.467 compared with 0.392 for thirteen developed countries. The maximum equalisation percentage is 35.8 for the developing countries compared with 28.4 for the developed countries. The greater degree of income inequality in the developing countries appears largely due to the higher share of income received by the richest 5 per cent of income recipients. In developing countries this share is 28.7 per cent, compared with 19.9 per cent in developed countries. The share going to the poorest 20 per cent in developing countries is slightly higher than in the developed countries, but there can be no comfort in this fact. The focus must be on absolute, as well as relative, poverty; and the poorest in countries with average *per capita* incomes less than $1000 per annum must be very poor indeed. On average, the *per capita* income of the poorest 20 per cent of the population in the typical developing country is about 30 per cent of the national average. As we said earlier in the chapter, there are about 600 million people living on *per capita* incomes of less than $275 per annum at 1985 prices: 50 million in Latin America; 450 million in Asia, and 100 million in Africa.

Several formidable barriers exist to raising the living standards of the poorest, and to narrowing the income distribution overall. There is the dualistic nature of many economies (see Chapter 5), perpetuated by feudal land-tenure systems and urban bias in the allocation of investment resources. There is inequality in the distribution of education facilities to contend with, particularly the lack of facilities in rural areas where the poorest are concentrated. Third, there is disguised unemployment on the land and underemployment and open unemployment in urban areas created by rural-urban migration, a shortage of investment resources, and inappropriate technological choices. Until development policy comes to grips with these problems, there will continue to be large pockets of

Table 1.5 ***Size Distribution of Personal Income Before Tax in Fifty-Six Countries: Income Shares Received by Quintiles of Recipients in the Neighbourhood of 1965***

Country and level of GDP per head	*Percentiles of recipients*						*Gini coefficient*	*Maximum equalisation percentage*	*GDP per head in 1965 ($US)*
	Below 20	*21–40*	*41–60*	*61–80*	*81–95*	*95–100*			
Under $100									
Chad (1958)	8.0	11.6	15.4	22.0	20.0	23.0	0.35	25.0	68
Dahomey (1959)	8.0	10.0	12.0	20.0	18.0	32.0	0.42	30.0	73
Niger (1960)	7.8	11.6	15.6	23.0	19.0	23.0	0.34	25.0	81
Nigeria (1969)	7.0	7.0	9.0	16.1	22.5	38.4	0.51	40.9	74
Sudan (1969)	5.6	9.4	14.3	22.6	31.0	17.1	0.40	30.7	97
Tanzania (1964)	4.8	7.8	11.0	15.4	18.1	42.9	0.54	41.0	61
Burma (1958)	10.0	13.0	13.0	15.5	20.3	28.2	0.35	28.5	64
India (1956–7)	8.0	12.0	16.0	22.0	22.0	20.0	0.33	24.0	95
Madagascar (1960)	3.9	7.8	11.3	18.0	22.0	37.0	0.53	39.0	92
Group average	*7.0*	*10.0*	*13.1*	*19.4*	*21.4*	*29.1*	*0.419*	*31.6*	*78.3*
$101–200									
Morocco (1965)	7.1	7.4	7.7	12.4	44.5	20.6	0.50	45.4	180
Senegal (1960)	3.0	7.0	10.0	16.0	28.0	36.0	0.56	44.0	192
Sierra Leone (1968)	3.8	6.3	9.1	16.7	30.3	33.8	0.56	44.1	142
Tunisia (1971)	5.0	5.7	10.0	14.4	42.6	22.4	0.53	44.9	187
Bolivia (1968)	3.5	8.0	12.0	15.5	25.3	35.7	0.53	41.0	132
Ceylon (Sri Lanka) (1963)	4.5	9.2	13.8	20.2	33.9	18.4	0.44	32.5	140
Pakistan (1963–4)	6.5	11.0	15.5	22.0	25.0	20.0	0.37	27.0	101
South Korea (1966)	9.0	14.0	18.0	23.0	23.5	12.5	0.26	19.0	107
Group average	*5.3*	*8.6*	*12.0*	*17.5*	*31.6*	*24.9*	*0.468*	*37.2*	*147.6*
$201–300									
Malaya (1957–8)	6.5	11.2	15.7	22.6	26.2	17.8	0.36	26.6	278
Fiji (1968)	4.0	8.0	13.3	22.4	30.9	21.4	0.46	34.7	295
Ivory Coast (1959)	8.0	10.0	12.0	15.0	26.0	29.0	0.43	35.0	213
Zambia (1959)	6.3	9.6	11.1	15.9	19.6	37.5	0.48	37.1	207
Brazil (1960)	3.5	9.0	10.2	15.8	23.1	38.4	0.54	41.5	207
Ecuador (1968)	6.3	10.1	16.1	23.2	19.6	24.6	0.38	27.5	202
El Salvador (1965)	5.5	6.5	8.8	17.8	28.4	33.0	0.53	41.4	249
Peru (1961)	4.0	4.3	8.3	15.2	19.3	48.3	0.61	48.2	237
Iraq (1956)	2.0	6.0	8.0	16.0	34.0	34.0	0.60	48.0	285
Philippines (1961)	4.3	8.4	12.0	19.5	28.3	27.5	0.48	35.8	240
Colombia (1964)	2.2	4.7	9.0	16.1	27.7	40.4	0.62	48.0	275
Group average	*4.8*	*8.0*	*11.3*	*18.1*	*25.7*	*32.0*	*0.499*	*38.5*	*244.4*
$301–500									
Gabon (1960)	2.0	6.0	7.0	14.0	24.0	47.0	0.64	51.0	368
Costa Rica (1969)	5.5	8.1	11.2	15.2	25.0	35.0	0.50	40.0	360
Jamaica (1958)	2.2	6.0	10.8	19.5	31.3	30.2	0.56	41.5	465
Surinam (1962)	10.7	11.6	14.7	20.6	27.0	15.4	0.30	23.0	424
Lebanon (1955–60)	3.0	4.2	15.8	16.0	27.0	34.0	0.55	41.0	440
Barbados (1951–2)	3.6	9.3	14.2	21.3	29.3	22.3	0.45	32.9	368
Chile (1968)	5.4	9.6	12.0	20.7	29.7	22.6	0.44	33.0	486
Mexico (1963)	3.5	6.6	11.1	19.3	30.7	28.8	0.53	39.5	441
Panama (1969)	4.9	9.4	13.8	15.2	22.2	34.5	0.48	36.7	490
Group average	*4.5*	*7.9*	*12.3*	*18.0*	*27.4*	*30.0*	*0.494*	*37.6*	*426.9*

Table 1.5 ***Size Distribution of Personal Income Before Tax in Fifty-Six Countries: Income Shares Received by Quintiles of Recipients in the Neighbourhood of 1965*** *(continued)*

Country and level of GDP per head	*Percentiles of recipients*						*Gini coefficient*	*Maximum equalisation percentage*	*GDP per head in 1965 ($US)*
	Below 20	*21–40*	*41–60*	*61–80*	*81–95*	*95–100*			
$501–1000									
Republic of South Africa (1965)	1.9	4.2	10.2	26.4	18.0	39.4	0.58	43.7	521
Argentina	7.0	10.4	13.2	17.9	22.2	29.3	0.42	31.5	782
Trinidad and Tobago (1957–8)	3.4	9.1	14.6	24.3	26.1	22.5	0.44	32.9	704
Venezuela (1962)	4.4	9.0	16.0	22.9	23.9	23.2	0.42	30.6	904
Greece (1957)	9.0	10.3	13.3	17.9	26.5	23.0	0.38	29.5	591
Japan (1962)	4.7	10.6	15.8	22.9	31.2	14.8	0.39	28.9	838
Group average	*5.1*	*8.9*	*13.9*	*22.1*	*24.7*	*25.4*	*0.438*	*32.9*	*723.3*
$1001–2000									
Israel (1957)	6.8	13.4	18.6	21.8	28.2	11.2	0.30	21.2	1243
United Kingdom (1964)	5.1	10.2	16.6	23.9	25.0	19.0	0.38	28.1	1590
Netherlands (1962)	4.0	10.0	16.0	21.6	24.8	23.6	0.42	30.0	1400
Federal Republic of Germany (1964)	5.3	10.1	13.7	18.0	19.2	33.7	0.45	32.9	1667
France (1962)	1.9	7.6	14.0	22.8	28.7	25.0	0.50	36.5	1732
Finland (1962)	2.4	8.7	15.4	24.2	28.3	21.0	0.46	33.5	1568
Italy (1948)	6.1	10.5	14.6	20.4	24.3	24.1	0.40	28.8	1011
Puerto Rico (1963)	4.5	9.2	14.2	21.5	28.6	22.0	0.44	32.1	1101
Norway (1963)	4.5	12.1	18.5	24.4	25.1	15.4	0.35	24.9	1717
Australia (1966–7)	6.6	13.4	17.8	23.4	24.4	14.4	2.30	22.2	1823
Group average	*4.7*	*10.5*	*15.9*	*22.2*	*25.7*	*20.9*	*0.401*	*29.0*	*1485.2*
$2001 and above									
Denmark (1963)	5.0	10.8	18.8	24.2	26.3	16.9	0.37	25.4	2078
Sweden (1963)	4.4	9.6	17.4	24.6	26.4	17.6	0.39	28.6	2406
United States (1969)	5.6	12.3	17.6	23.4	26.3	14.8	0.34	24.5	3233
Group average	*5.0*	*10.9*	*17.9*	*24.1*	*26.3*	*16.4*	*0.365*	*26.5*	*2572.3*

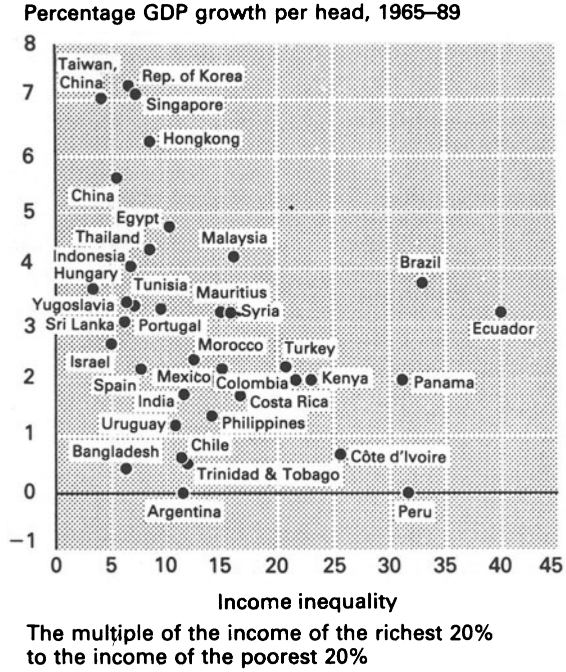
Source: F. Paukert, *International Labour Review* (August 1973), based on data compiled by I. Adelman and C. Morris, 'An Anatomy of Income Distribution Patterns in Developing Countries', *AID Development Digest* (October 1971).

absolute poverty and a marked degree of inequality in income distribution. In deciding on the allocation of investment resources and the choice of projects, a high weight needs to be given to projects which raise the income of the poorest in the income distribution (see Chapter 8). Fortunately, evidence from the World Bank does not suggest that growth and equity necessarily conflict. If anything, countries with a greater degree of equality have grown fastest. This is shown in **Figure 1.2** opposite where the growth of income per head is measured on the vertical axis, and income inequality is measured on the horizontal axis, and it can be seen that many of the fastest growing countries have a comparatively equal income distribution while many of the slowest growing countries have a high degree of income inequality. It appears that income inequality is not necessary for high levels of saving and investment or other factors that contribute to fast growth.

■ Growth and Distribution

Progress towards achieving the twin objectives of faster growth and a more equal distribution of income can be examined simultaneously by constructing **poverty-weighted indices of growth.**

Figure 1.2 *Income Inequality and Economic Growth*



Source: *World Development Report* 1991.

GNP growth as conventionally measured is a weighted average of the growth of income of different groups of people, where the relevant weights are each group's share of total income. The measured growth rate pays no regard to the distribution of income. A high growth rate may be recorded, which has benefited only the rich. For example, suppose the bottom one-third of the population receive 10 per cent of income; the middle one-third receive 30 per cent of income, and the top one-third receive 60 per cent of income. GNP growth would be measured as:

$$\text{\% growth of GNP} = r_1(0.1) + r_2(0.3) + r_3(0.6)$$

where r_1, r_2 and r_3 are the respective rates of growth of income of the three groups. Suppose $r_1 = 1$ per cent; $r_2 = 1$ per cent and $r_3 = 10$ per cent. A growth rate of GNP of 6.4 per cent would then be recorded which looks very respectable but the position of the poorest would hardly have changed.

The idea of constructing poverty weighted indices of growth is to give at least equal weight to all income groups in society, if not a greater weight to the poor, in order to obtain a better measure of the growth of overall welfare combining the growth of income with its distribution.

In the above example, for instance, if each group is given an equal weight of one-third, the measured growth of welfare becomes:

$$\text{\% growth of `welfare'} = 1(0.33) + 1(0.33) + 10(0.33) = 4\%$$

which is much less than the rate of growth shown by the conventional measure of GNP growth when distributional considerations are taken into account.

A society could go further and say it places no value or weight on income growth for the richest third of the population, and places all the weight on the lower income groups with, say, a 60 per cent weight to the bottom third and a 40 per cent weight to the middle third. The growth of 'welfare' would then look derisory:

$$\text{\% growth of `welfare'} = 1(0.6) + 1(0.4) + 10(0) = 1\%$$

This approach has been experimented with by economists from the World Bank (see Ahluwalia, Carter and Chenery (1979)) to compare countries, giving a 60 per cent weight to the lowest 40 per cent of the population; a 40 per cent weight to the middle 40 per cent and no weight to the top 20 per cent. In countries where the distribution of income deteriorated, the poverty-weighted measure of the growth of welfare shows less improvement than GNP growth, and where the distribution of income improved, the poverty-weighted growth rate shows more improvement than GNP growth.

■ Nutrition and Health

Low absolute levels of income can have serious consequences for the nutrition and health of individuals. It has been estimated by the UN Food and

Agriculture Organisation that there are at least one billion people in the world suffering from various degrees of malnutrition, including two-thirds of the world's one billion children. Malnutrition among children is particularly serious because it stunts growth and mental development, and adds another element to the vicious circle of poverty. Malnutrition is also a major cause of infant mortality, the rates of which are more than twice as high in developing countries as in developed countries. The costs of treating various forms of malnutrition are trivial relative to the tangible benefits, and to the costs of treating the consequences. To prevent malnutrition in children from the age of six months to three years, which is a child's most vulnerable period, can cost as little as $50 at current prices. The annual cost of preventing malnutrition is about the same as the daily cost of treating its effects. Vitamin A deficiency is a cause of blindness. The annual cost of supporting a blind person is at least 1000 times the annual ingredient cost of the vitamin A needed for prevention. Iodate deficiency is a cause of goitre, which leads to cretinism and deaf-mutism. The cost of iodate to prevent goitre is one-sixth of a cent per person per year. And so one could go on. Prevention is better than cure not only for the individual but also in a very real economic sense for the welfare of society as a whole.

The relation between low-income and food intake is two-way. Low income is a cause of malnutrition. Malnutrition in turn is a cause of low income by impairing working efficiency and productivity. All too little is known about the second relationship. But we do know that the food requirements considered by nutritionists to be necessary for efficient working and healthy living are far greater than the levels achieved by a large minority of the population in developing countries. Calorie deficiency causes loss of body weight, tiredness, listlessness, and a deterioration of mental faculties. Calories are also required for the absorption of protein which is otherwise used up for energy. Protein deficiency causes such conditions as kwashiorkor (the bloated stomachs and staring eyes we see on our television screens), which may cause death in children. Protein is particularly important for brain development in the first three years of life, during which the brain grows to 90 per cent of its full size. Brain damage due to protein deficiency is irreversible.

Poverty, Famine and Entitlements

Malnutrition is caused by a lack of access to food, but this does not only depend on the availability of food; it also depends on people's entitlement to food. Vast sections of the population may go short of food, and experience famine conditions, not primarily because food has become scarce, but because their entitlement to food has been impaired. This is the powerful thesis put forward by Professor Sen (1984), who argues that to understand poverty and starvation, or malnutrition associated with it, it is necessary to understand both ownership patterns and exchange entitlements, which requires in turn an understanding of modes of production and the class structure. He attempts to document the theory drawing on the experience of major famines such as the Great Bengal famine of 1943; the Ethiopian famine of 1973–5; the famine in the Sahel region of Africa in the early 1970s, and the Bangladesh famine of 1974. It seems that some of the worst famines occurred with no significant fall in food availability per head.

What does the entitlement to food depend on? Above all, it depends on the ability of individuals to exchange productive resources and goods for food. This depends in turn on such factors as the ownership and employment status of individuals (for example, whether they are owners of land, labourers, peasant farmers, sharecroppers, etc.); productivity; non-working income in the form of subsidies and transfer payments; and on the terms of trade between food and other goods. Exchange entitlements may deteriorate independently of a general decline in the supply of food which raises its price and worsens the terms of trade for other goods. Job opportunities may diminish; real wages or productivity may fall, and other people may become better off and demand more food. During the Great Bengal famine of 1943, 3 million people died, yet in terms of the total availability of food grains, 1943 was not a subnormal year. Starvation occurred because food entitlements shrunk as a result of first, a rise in the price of food due to military procurement, secondly, because the price of other commodities fell as more monetary demand was switched to food, and thirdly, because of a fall in the output of other goods. Because of their ownership position, however, those in rural areas suffered less than the urban poor. The absence of famine in China and other socialist countries is not so much the result of increases in food production per head, but the result of a shift in the entitlement system through guaranteed employment and social security provisions.

The policy message is that the alleviation of famine requires the establishment and preservation of adequate entitlements to food, not simply the provision of more food – important as that may be. Public action requires programmes of **food security** which guarantee that people have access to enough food at all times, and **nutrition programmes** working through clinics targeted particularly at children and pregnant women.[1]

■ Food Production

At the global level the problem of nutrition, and of food supply to those who need it, is also essentially a distribution problem. It is not a capacity problem in the sense that the world is physically incapable of producing enough food to feed its inhabitants adequately. Since the Second World War global food production has generally kept pace with population growth, and the world is probably capable of feeding itself ten times over if need be. The worrying factor that needs to be stressed, however, is that most of the increase in world food production that has taken place in recent years has been in the granary of North America. Food production in the developing countries has barely kept pace with population growth and there has been no margin of safety or very little provision for improving the distribution of food supplies. A dangerous dependence has grown up on North America and the EEC. In 1972, for the first time since the war, world food production actually fell. In 1973 the world was threatened with a food crisis. Stocks of wheat amounted to only four weeks of world consumption. A crop failure in just one major producing area would have spelt disaster. Disaster was averted by reasonably good weather and harvests. But the situation is still precarious and malnutrition persists. It is an intolerable situation that year in and year out, at the end of the twentieth century, millions of people should have their very lives threatened by the vagaries of the weather, or by sudden political upheavals which impair their ability to import food. How has this precarious situation arisen? The answer is simple enough: through the neglect of agriculture. If blame is to be apportioned it must lie jointly with the international development agencies and the developing countries themselves. In the early 1950s the developing countries saw industrialisation as the road to development and starved agriculture of resources. International development agencies supported industrialisation plans and rarely lent money for agricultural projects. Technically, it is well within the world's grasp to increase agricultural production on an immense scale. What is required is the initiative and political will, both within the international community and the developing countries, to make the radical changes necessary. As far as the international community is concerned, it could increase its foreign aid for agricultural projects, especially where this could lead to a significant breakthrough in agricultural production. For example, the investment of $3 billion to eliminate the tsetse fly in infested areas of tropical Africa could open up seven million square kilometres to livestock and crop production. There must also be genuine international co-operation and agreement to guarantee world food supplies. One possibility would be to have a system of granaries strategically placed across the world under international supervision, which could store the food surpluses of the 'north' and release them at time of need. This in no way need preclude or hinder the fundamental agricultural reforms that everyone recognises are necessary in many of the poorer countries in Africa and elsewhere if there is to be self-sustaining growth. The desirability of a development policy based on a healthy agricultural sector is emphasised in Chapter 3.

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[1] See the work of Dreze and Sen (1989) for the hunger and poverty project of the World Institute for Development Economics Research (WIDER).

Lack of adequate food supply and nutrition, combined with rudimentary health facilities, leads to low life expectancy and a high incidence of infant and child mortality. **Tables 1.6** and **1.7** present some selected statistics showing changes in the level of food production per head; daily *per capita* calorie intake as a percentage of requirements, and various health-related indicators including the number of people that share a doctor, the percentage of the population with access to safe water, life expectancy at birth and rates of infant and child mortality.

Table 1.6 ***Health Related Indicators: Food Production, Calorie Intake and Doctors***

	Average index of food production per capita (1979–81 = 100)	*Daily calorie supply (per capita)*		*Population per doctor*
	1988–90	*1965*	*1989*	*1984*
Low-income economies	**119 *w***	**1 975 *w***	**2 406 *w***	**5 800 *w***
China and India	**127 *w***	**1 966 *w***	**2 464 *w***	**1 650 *w***
Other low-income	**105 *w***	**1 994 *w***	**2 298 *w***	**14 160 *w***
Mozambique	81	1 712	1 680	. .
Tanzania	88	1 831	2 206	*24 970*
Ethiopia	84	1 853	1 667	*78 780*
Somalia	94	1 718	1 906	*19 950*
Nepal	115	1 889	2 077	*30 220*
Chad	85	2 395	1 743	*38 390*
Bhutan	93	. .	. .	*9 730*
Lao PDR	114	2 135	2 630	1 360
Malawi	83	2 259	2 139	*11 340*
Bangladesh	96	1 970	2 021	6 390
Burundi	92	2 131	1 932	*21 020*
Zaire	97	2 187	1 991	*13 540*
Uganda	95	2 361	2 153	. .
Madagascar	88	2 447	2 158	9 780
Sierra Leone	89	2 014	1 799	*13 620*
Mali	97	1 938	2 314	25 390
Nigeria	106	2 185	2 312	*6 410*
Niger	71	1 996	2 308	*39 670*
Rwanda	77	1 856	1 971	*35 090*
Burkina Faso	114	1 882	2 288	*57 183*
India	119	2 021	2 229	*2 520*
Benin	112	2 019	2 305	*15 940*
China	133	1 929	2 639	1 010

Table 1.6 ***Health Related Indicators: Food Production, Calorie Intake and Doctors*** **(*continued*)**

	Average index of food production per capita (1979–81 = 100)	*Daily calorie supply (per capita)*		*Population per doctor*
	1988–90	*1965*	*1989*	*1984*
Haiti	94	2 045	2 013	*7 140*
Kenya	106	2 208	2 163	10 050
Pakistan	101	1 773	2 219	*2 900*
Ghana	97	1 937	2 248	*20 390*
Central African Rep.	91	2 055	2 036	. .
Togo	88	2 454	2 214	*8 700*
Zambia	103	2 072	2 077	7 150
Guinea	87	2 187	2 132	. .
Sri Lanka	87	2 171	2 277	*5 520*
Mauritania	85	1 903	2 685	*11 900*
Lesotho	86	2 049	2 299	18 610
Indonesia	123	1 791	2 750	*9 410*
Honduras	83	1 967	2 247	*1 510*
Egypt, Arab Rep.	118	2 399	3 336	*770*
Afghanistan	85	2 304	. .	. .
Cambodia	165	2 292	2 166	. .
Liberia	84	2 158	2 382	*9 340*
Myanmar	93	1 897	2 440	3 740
Sudan	71	1 938	1 974	*10 190*
Vietnam	127	2 041	2 233	*950*
Middle-income economies	**102 *w***	**2 489 *w***	**2 860 *w***	**2 250 *w***
Lower-middle-income	**98 *w***	**2 415 *w***	**2 768 *w***	**3 000 *w***
Bolivia	109	1 868	1 916	*1 530*
Zimbabwe	94	2 075	2 299	6 700
Senegal	102	2 372	2 369	. .
Philippines	84	1 875	2 375	6 570
Côte d'Ivoire	101	2 352	2 577	. .
Dominican Rep.	90	1 834	2 359	*1 770*
Papua New Guinea	103	1 996	2 403	6 070
Guatemala	91	2 026	2 235	*2 180*
Morocco	128	2 112	3 020	*4 730*
Cameroon	89	2 011	2 217	. .
Ecuador	100	2 191	2 531	*810*
Syrian Arab Rep.	80	2 177	3 003	*1 250*
Congo	94	2 260	2 590	. .
El Salvador	97	1 853	2 317	*2 830*
Paraguay	116	2 586	2 757	*1 460*

Table 1.6 ***Health Related Indicators: Food Production, Calorie Intake and Doctors*** **(*continued*)**

	Average index of food production per capita (1979–81 = 100)	*Daily calorie supply (per capita)*		*Population per doctor*
	1988–90	*1965*	*1989*	*1984*
Peru	100	2 323	2 186	*1 040*
Jordan	100	2 277	2 634	*860*
Colombia	104	2 179	2 598	*1 230*
Thailand	106	2 138	2 316	*6 290*
Tunisia	87	2 217	3 121	*2 150*
Jamaica	95	2 232	2 609	2 040
Turkey	97	2 698	3 236	1 390
Romania	92	2 988	3 155	570
Poland	109	3 292	3 505	490
Panama	90	2 241	2 539	1 000
Costa Rica	91	2 367	2 808	*960*
Chile	113	2 581	2 581	*1 230*
Botswana	75	2 045	2 375	*6 900*
Algeria	96	1 701	2 866	*2 340*
Bulgaria	96	3 443	3 707	*280*
Mauritius	100	2 269	2 887	1 900
Malaysia	147	2 353	2 774	*1 930*
Argentina	93	3 163	3 113	*370*
Iran, Islamic Rep.	104	2 060	3 181	*2 840*
Albania	92	2 374	2 761	..
Angola	81	1 907	1 807	*17 750*
Lebanon	135	2 485	..	..
Mongolia	86	2 364	2 479	..
Namibia	93	1 900	1 946	..
Nicaragua	58	2 305	2 265	*1 500*
Upper-middle-income	**109 w**	**2 584 w**	**2 987 w**	**940 w**
Mexico	102	2 570	3 052	..
South Africa	87	2 759	3 122	..
Venezuela	96	2 266	2 582	*700*
Uruguay	109	2 812	2 653	510
Brazil	115	2 417	2 751	*1 080*
Hungary	113	3 134	3 644	310
Yugoslavia	95	3 243	3 634	*550*
Czechoslovakia	119	3 397	3 632	280
Gabon	84	1 950	2 383	*2 790*
Trinidad and Tobago	87	2 496	2 853	*940*

Table 1.6 ***Health Related Indicators: Food Production, Calorie Intake and Doctors*** **(continued)**

	Average index of food production per capita (1979–81 = 100)	*Daily calorie supply (per capita)*		*Population per doctor*
	1988–90	*1965*	*1989*	*1984*
Portugal	106	2 647	3 495	140
Korea, Rep.	106	2 178	2 852	*1 160*
Greece	103	3 019	3 825	*350*
Saudi Arabia	189	1 850	2 874	*730*
Iraq	92	2 150	2 887	*1 740*
Libya	78	1 875	3 324	*690*
Oman	..	..	..	1 700
High-income economies	**100 w**	**3 091 w**	**3 409 w**	**470 w**
OECD members	**101 w**	**3 099 w**	**3 417 w**	**460 w**
Other	**80 w**	**2 546 w**	**3 072 w**	**880 w**
Ireland	109	3 605	3 778	*680*
Israel	95	2 799	3 174	*350*
Spain	112	2 770	3 572	*320*
Singapore	69	2 285	3 198	*1 410*
Hong Kong	80	2 486	2 853	*1 070*
New Zealand	102	3 238	3 362	580
Belgium	108	..	..	330
United Kingdom	105	3 304	3 149	..
Italy	94	3 097	3 504	*230*
Australia	95	3 053	3 216	*440*
Netherlands	111	3 024	3 151	450
Austria	106	3 244	3 495	390
France	103	3 355	3 465	*320*
United Arab Emirates	..	2 639	3 309	*1 020*
Canada	108	3 127	3 482	*510*
United States	92	3 234	3 671	*470*
Denmark	126	3 420	3 628	*400*
Germany	112	3 088	3 443	*380*
Norway	100	3 036	3 326	*450*
Sweden	99	2 930	2 960	390
Japan	101	2 668	2 956	*660*
Finland	105	3 126	3 253	*440*
Switzerland	101	3 471	3 562	*700*
Kuwait	..	2 766	3 195	*640*
World	**112 w**	**2 383 w**	**2 711 w**	**4 200 w**
	104 w	**2 093 w**	**2 642 w**	**4 480 w**

w means weighted average.
Source: *World Development Report 1992.*

Table 1.7 *Life Expectancy*

	Under-5 mortality rate (per 1000 live births)		*Life expectancy at birth (years)*			
			Female		*Male*	
	Female 1990	*Male 1990*	*1965*	*1990*	*1965*	*1990*
Low-income economies	**91 w**	**98 w**	**50 w**	**62 w**	**48 w**	**61 w**
China and India	**69 w**	**72 w**	**52 w**	**66 w**	**50 w**	**65 w**
Other low-income	**131 w**	**145 w**	**45 w**	**56 w**	**44 w**	**54 w**
Mozambique	194	215	39	48	36	45
Tanzania	182	203	45	49	41	46
Ethiopia	185	205	43	50	42	46
Somalia	200	223	40	50	37	47
Nepal	183	175	40	51	41	53
Chad	198	221	38	49	35	45
Bhutan	183	179	40	47	41	50
Lao PDR	159	179	42	51	39	48
Malawi	242	255	40	47	38	46
Bangladesh	160	142	44	51	45	52
Burundi	167	187	44	48	41	45
Zaire	143	162	45	54	42	50
Uganda	185	206	48	47	46	46
Madagascar	160	178	45	52	42	50
Sierra Leone	236	261	34	44	31	40
Mali	209	238	39	50	37	46
Nigeria	152	171	43	54	40	49
Niger	204	227	38	47	35	44
Rwanda	192	213	45	50	42	47
Burkina Faso	190	210	40	49	37	46
India	121	116	44	58	46	60
Benin	155	173	43	52	41	49
China	29	40	57	71	53	69
Haiti	126	144	47	56	44	53
Kenya	97	112	50	61	46	57
Pakistan	151	145	45	55	47	56
Ghana	127	144	49	57	46	53
Central African Rep.	156	176	41	51	40	48
Togo	133	151	44	55	40	52
Zambia	123	140	46	52	43	48
Guinea	221	245	36	43	34	43
Sri Lanka	21	26	64	73	63	69
Mauritania	193	215	39	48	36	45

Table 1.7 ***Life Expectancy*** **(*continued*)**

	Under-5 mortality rate (per 1000 live births)		*Life expectancy at birth (years)*			
			Female		*Male*	
	Female 1990	*Male 1990*	*1965*	*1990*	*1965*	*1990*
Lesotho	125	142	50	57	47	55
Indonesia	75	90	45	64	43	60
Honduras	70	85	51	67	48	63
Egypt, Arab Rep.	95	110	50	62	48	59
Afghanistan	241	..	..	..	..	..
Cambodia	161	180	46	52	43	49
Liberia	168	193	46	56	43	53
Myanmar	78	94	49	64	46	59
Sudan	159	178	41	52	39	49
Viet Nam	46	59	51	69	48	64
Middle-income economies	**57w**	**68 w**	**60 w**	**69 w**	**56 w**	**64 w**
Lower-middle-income	**62 w**	**73 w**	**58 w**	**67 w**	**55 w**	**63 w**
Bolivia	109	127	47	62	42	58
Zimbabwe	66	78	50	63	46	59
Senegal	120	137	42	49	40	46
Philippines	45	57	57	66	54	62
Côte d'Ivoire	126	144	44	57	40	54
Dominican Rep.	68	75	57	69	54	65
Papua New Guinea	70	84	44	56	44	54
Guatemala	76	91	50	66	48	61
Morocco	84	99	51	64	48	60
Cameroon	117	134	47	59	44	55
Ecuador	58	72	57	68	55	64
Syrian Arab Rep.	55	67	54	68	51	64
Congo	172	185	47	56	41	50
El Salvador	63	76	56	68	53	60
Paraguay	33	44	67	69	63	65
Peru	78	93	52	65	49	61
Jordan	62	68	52	69	49	66
Colombia	40	49	61	72	57	66
Thailand	28	38	58	68	54	63
Tunisia	50	63	52	68	51	66
Jamaica	16	22	67	75	64	71
Turkey	73	80	55	69	52	64
Romania	23	32	70	73	66	67

Table 1.7 ***Life Expectancy*** **(*continued*)**

	Under-5 mortality rate (per 1000 live births)		*Life expectancy at birth (years)*			
			Female		*Male*	
	Female 1990	*Male 1990*	*1965*	*1990*	*1965*	*1990*
Poland	18	23	72	75	66	67
Panama	21	29	65	75	62	71
Costa Rica	18	22	66	78	63	73
Chile	18	23	63	76	57	69
Botswana	41	53	49	69	46	65
Algeria	83	91	51	66	49	65
Bulgaria	14	19	73	76	68	70
Mauritius	21	28	63	73	59	67
Malaysia	17	22	60	72	56	68
Argentina	30	40	69	75	63	68
Iran, Islamic Rep.	103	122	52	63	52	63
Albania	28	33	67	75	65	70
Angola	207	230	37	48	34	44
Lebanon	..	..	64	..	60	..
Mongolia	76	91	51	64	49	61
Namibia	119	140	47	59	44	56
Nicaragua	66	80	52	66	49	63
Yemen, Rep.	172	191	41	49	39	48
Upper-middle-income	**49 w**	**60 w**	**62 w**	**71 w**	**58 w**	**65 w**
Mexico	41	51	61	73	58	66
South Africa	81	98	54	65	49	59
Venezuela	36	45	65	73	61	67
Uruguay	22	28	72	77	65	70
Brazil	62	75	59	69	55	63
Hungary	16	22	72	75	67	67
Yugoslavia	25	30	68	76	64	69
Czechoslovakia	13	17	73	75	67	68
Gabon	148	167	44	55	41	52
Trinidad and Tobago	25	34	67	74	63	69
Portugal	14	17	68	78	62	72
Korea, Rep.	17	24	58	73	55	67
Greece	13	15	72	80	69	74
Saudi Arabia	72	87	50	66	47	63
Iraq	81	89	53	66	51	61
Libya	84	100	51	64	48	60
Oman	36	46	45	68	43	64

Table 1.7 ***Life Expectancy*** **(*continued*)**

	Under-5 mortality rate (per 1000 live births)		*Life expectancy at birth (years)*			
	Female	*Male*	*Female*		*Male*	
	1990	*1990*	*1965*	*1990*	*1965*	*1990*
High-income economies	**9 *w***	**12 *w***	**74 *w***	**80 *w***	**68 *w***	**74 *w***
OECD members	**9 *w***	**11 *w***	**74 *w***	**80 *w***	**68 *w***	**74 *w***
Other	**14 *w***	**18 *w***	**70*w***	**77 *w***	**65 *w***	**73 *w***
Ireland	8	10	73	77	69	72
Israel	11	15	74	78	71	74
Spain	9	12	74	79	69	73
Singapore	7	10	68	77	64	71
Hong Kong	7	10	71	80	64	75
New Zealand	10	15	74	79	68	72
Belgium	10	12	74	80	68	73
United Kingdom	9	12	74	78	68	73
Italy	10	12	73	80	68	75
Australia	8	11	74	80	68	74
Netherlands	8	10	76	80	71	74
Austria	9	13	73	80	66	73
France	8	10	75	81	68	73
United Arab Emirates	23	32	59	74	56	69
Canada	7	9	75	81	69	74
United States	10	13	74	80	67	73
Denmark	9	11	75	78	70	73
Germany	8	11	73	80	67	73
Norway	9	11	76	81	71	74
Sweden	6	8	76	81	72	75
Japan	5	7	73	82	68	76
Finland	7	9	73	79	66	73
Switzerland	7	9	75	82	69	75
Kuwait	14	20	65	76	61	72
World	**64 *w***	**70 *w***	**58 *w***	**67 *w***	**55 *w***	**64 *w***

w stands for weighted average.

Source: *World Development Report* 1992.

As far as food production *per capita* is concerned, it has risen on average by just over 1 per cent per annum in the last ten years in the low-income countries, but hardly at all if China and India are excluded from the sample. In the middle-income countries progress has also been very slow and in some low and middle-income countries *per capita* food production actually fell.

Daily *per capita* calorie intake shows most of the poorest countries below the required level of 2500, while the 'obese' industrial countries have an average intake of 40 per cent above requirements.

The average people to doctor ratio in developed countries is 500 : 1, while in low-income and middle-income countries over 5000 people share one doctor.

In the light of the above facts, it is no surprise that life expectancy is low in developing countries compared to the rich industrialised countries. In low- and middle-income countries we find that life expectancy at birth averages 63 years compared to 77 years in developed countries. In many of the poorest countries life expectancy is little more than 40 years. The infant and child mortality rates in poor countries are particularly high relative to the rich countries. Infant mortality is higher than 100 per 1000 in some poor countries compared with 8 per 1000 in rich countries. And while child mortality averages ten per 1000 in the rich countries, it averages 70 per 1000 in the low-income countries (excluding China and India).

■ Education

There has been an enormous growth in public expenditure on education in developing countries in recent years – some would say too much – but expenditure *per capita* is still only one-twelfth of that in developed countries. The statistics in **Table 1.8** indicate the relative underprovision of facilities and opportunities in poor countries, and the still low rate of literacy in the poorest countries. The adult literacy rate in the low-income countries

Table 1.8 *Education Statistics*

	Percentage of age group enrolled in education					
	Primary		*Secondary*			
	Total		*Total*		*Tertiary (total)*	
	1965	*1989*	*1965*	*1989*	*1965*	*1989*
Low-income economies	**73 *w***	**105 *w***	**20 *w***	**38 *w***	**2 *w***	..
China and India	**83 *w***	**119 *w***	**25 *w***	**44 *w***	**2 *w***	..
Other low-income	**50 *w***	**77 *w***	**10 *w***	**28 *w***	**1 *w***	**4 *w***
Mozambique	37	*68*	3	*5*	0	*0*
Tanzania	32	63	2	4	0	0
Ethiopia	11	*38*	2	*15*	0	1
Somalia	10	..	2	..	0	..
Nepal	20	*86*	5	*30*	1	*6*
Chad	34	*57*	1	7	..	*1*
Bhutan	7	*26*	0	*5*	..	..
Lao PDR	40	*111*	2	*27*	0	*2*
Malawi	44	*67*	2	*4*	0	*1*
Bangladesh	49	70	13	17	1	4

Table 1.8 ***Education Statistics (continued)***

	Percentage of age group enrolled in education					
	Primary		*Secondary*			
	Total		*Total*		*Tertiary (total)*	
	1965	*1989*	*1965*	*1989*	*1965*	*1989*
Burundi	26	*71*	1	*4*	0	*1*
Zaire	70	*78*	5	*24*	0	2
Uganda	67	*77*	4	*13*	0	*1*
Madagascar	65	92	8	*19*	1	4
Sierra Leone	29	*53*	5	*18*	0	*1*
Mali	24	23	4	6	0	..
Nigeria	32	70	5	19	0	*3*
Niger	11	28	1	6	..	1
Rwanda	53	69	2	7	0	1
Burkina Faso	12	35	1	7	0	1
India	74	98	27	43	5	..
Benin	34	*65*	3	..	0	2
China	89	135	*24*	44	0	2
Haiti	50	*84*	*5*	*19*	0	..
Kenya	54	*94*	4	*23*	0	2
Pakistan	40	38	12	20	2	5
Ghana	69	75	13	*39*	1	2
Central African Rep.	*56*	*64*	2	*11*	..	*1*
Togo	*55*	*103*	5	22	0	*3*
Zambia	53	*95*	7	*20*	..	2
Guinea	31	34	5	9	0	*1*
Sri Lanka	93	107	35	74	2	4
Mauritania	13	*51*	1	16	..	*3*
Lesotho	94	110	4	26	0	*4*
Indonesia	72	*118*	12	*47*	1	..
Honduras	80	*108*	10	..	1	10
Egypt, Arab Rep.	*75*	*97*	26	81	7	*20*
Afghanistan	16	24	2	8	0	*1*
Cambodia	77	..	9	..	1	..
Liberia	41	..	5	..	1	*3*
Myanmar	71	*103*	15	*24*	1	*5*
Sudan	29	..	4	..	1	3

Table 1.8 *Education Statistics (continued)*

	Percentage of age group enrolled in education					
	Primary		*Secondary*			
	Total		*Total*		*Tertiary (total)*	
	1965	*1989*	*1965*	*1989*	*1965*	*1989*
Middle-income economies	**93 *w***	**102 *w***	**26 *w***	**55 *w***	**7 *w***	**17 *w***
Lower-middle-income	**88 *w***	**101 *w***	**26 *w***	**54 *w***	**7 *w***	**17 *w***
Bolivia	73	81	18	34	5	23
Zimbabwe	110	125	6	52	0	6
Senegal	40	58	7	16	1	3
Philippines	113	111	41	73	19	*28*
Côte d'Ivoire	60	· ·	6	*20*	0	· ·
Dominican Rep.	87	*95*	12	· ·	2	· ·
Papua New Guinea	44	*73*	4	13	· ·	· ·
Guatemala	50	*79*	8	*21*	2	· ·
Morocco	57	68	11	36	1	11
Cameroon	94	101	5	26	0	3
Ecuador	91	118	17	*56*	3	*25*
Syrian Arab Rep.	78	108	28	54	8	20
Congo	114	· ·	10	· ·	1	6
El Salvador	82	78	17	26	2	17
Paraguay	102	106	13	29	4	8
Peru	99	123	25	67	8	32
Jordan	95	· ·	38	· ·	2	· ·
Colombia	84	107	17	52	3	14
Thailand	78	86	14	*28*	2	16
Tunisia	91	115	16	44	2	8
Jamaica	109	105	51	*61*	3	5
Turkey	101	112	16	51	4	13
Romania	101	95	39	88	10	9
Poland	104	99	69	81	18	20
Panama	102	107	34	*59*	7	22
Costa Rica	106	100	24	41	6	27
Chile	124	100	34	75	6	*19*
Botswana	65	111	3	37	· ·	3
Algeria	68	94	7	61	1	*11*
Bulgaria	103	97	54	75	17	26
Mauritius	101	103	26	53	3	2
Malaysia	90	96	28	*59*	2	*7*
Argentina	101	*111*	28	*74*	14	*41*

Table 1.8 *Education Statistics (continued)*

	Percentage of age group enrolled in education					
	Primary		*Secondary*			
	Total		*Total*		*Tertiary (total)*	
	1965	*1989*	*1965*	*1989*	*1965*	*1989*
Iran, Islamic Rep.	63	109	18	53	2	7
Albania	92	99	33	80	8	9
Angola	39	94	5	11	0	..
Lebanon	106	..	26	..	14	..
Mongolia	98	98	66	..	8	..
Namibia	..	..	..	..	..	..
Nicaragua	69	99	14	*43*	2	*8*
Yemen, Rep.	13	..	3	..	..	..
Upper-middle-income	**99 *w***	**104 *w***	**26 *w***	**56 *w***	**5 *w***	**17 *w***
Mexico	92	114	17	53	4	15
South Africa	90	..	15	..	4	..
Venezuela	94	*105*	27	*56*	7	*28*
Uruguay	106	*106*	44	*77*	8	*50*
Brazil	108	105	16	39	2	11
Hungary	101	94	..	76	13	15
Yugoslavia	106	95	65	80	13	19
Czechoslovakia	99	92	29	87	14	18
Gabon	134	..	11	..	..	*4*
Trinidad and Tobago	93	97	36	83	2	6
Portugal	84	111	42	53	5	18
Korea, Rep.	101	108	35	86	6	38
Greece	110	*102*	49	*97*	10	*28*
Saudi Arabia	24	*76*	4	*46*	1	*12*
Iraq	74	*96*	28	*47*	4	*14*
Libya	78	..	14	..	1	..
Oman	..	102	..	48	..	*4*
High-income economies	**104 *w***	**105 *w***	**61 *w***	**95 *w***	**21 *w***	**42 *w***
OECD members	**104 *w***	**105 *w***	**63 *w***	**95 *w***	**21 *w***	**43 *w***
Other	**99 *w***	**103 *w***	**39 *w***	**77 *w***	**11 *w***	**24 *w***
Ireland	108	*101*	51	*97*	12	*26*
Israel	95	93	48	83	20	*33*

Table 1.8 ***Education Statistics (continued)***

	Percentage of age group enrolled in education					
	Primary		*Secondary*			
	Total		*Total*		*Tertiary (total)*	
	1965	*1989*	*1965*	*1989*	*1965*	*1989*
Spain	115	*111*	38	*105*	6	32
Singapore	105	110	45	69	10	· ·
Hong Kong	103	*105*	29	*73*	5	· ·
New Zealand	106	106	75	88	15	41
Belgium	109	*101*	75	99	15	*34*
United Kingdom	92	*107*	66	*82*	12	*24*
Italy	112	96	47	78	11	29
Australia	99	106	62	82	16	32
Netherlands	104	*116*	61	*103*	17	*32*
Austria	106	104	52	82	9	31
France	134	113	56	97	18	37
United Arab Emirates	· ·	111	· ·	64	0	9
Canada	105	105	56	105	26	66
United States	100	· ·	· ·	· ·	40	*63*
Denmark	98	98	83	*109*	14	*32*
Germany	· ·	*103*	· ·	*97*	· ·	*32*
Norway	97	98	64	98	11	36
Sweden	95	104	62	91	13	31
Japan	100	102	82	96	13	31
Finland	92	99	76	112	11	43
Switzerland	87	· ·	37	· ·	8	*26*
Kuwait	116	*100*	52	*90*	· ·	*18*
World	**85 *w***	**105 *w***	**31 *w***	**52 *w***	**9 *w***	**16 *w***

w: means weighted average.
Source: *World Development Report*, 1992.

averages just 60 per cent compared to 78 per cent in the middle-income countries and 99 per cent in rich countries. While there has been a major improvement in the literacy *rate* in most countries over the last two decades, the absolute number of those illiterate has actually increased. Except in the poorest countries, most children now have access to some form of rudimentary primary education, but the drop-out rate even from primary schools is often high. Secondary education is still a luxury in most developing countries, as is higher education. This is not to say the more educational provision, the better. Education confers undoubted benefits on individuals and societies, but it can also confer costs by exacerbating certain development difficulties. Education inculcates knowledge and skills which raise productivity, but it can also perpetuate inequalities in societies and impart values, attitudes and aspirations which are inimical to development; for example, the adoption of practices and institutional structures inappropriate to the environment of the country. Societies need to look carefully at the nature and allocation of educational provision in relation to the needs and aspirations of the society. It would be hard to argue, however, that a higher rate of literacy and numeracy and more training in vocational skills would not be in the private and social interest. The problem again is one of competing claims on limited resources.

■ Basic Needs

The provision of health services, education, housing, sanitation, water supply and adequate nutrition, came to be known in development circles in the 1970s (and supported by the World Bank) as the **basic needs approach** to economic development. The rationale of the approach was that the direct provision of such goods and services is likely to relieve absolute poverty more immediately than alternative strategies which simply attempt to accelerate growth or which rely on raising the incomes and productivity of the poor. Arguments used in support of this change in strategy were as follows: growth strategies usually fail to benefit those intended; the productivity and incomes of the poor depend in the first place on the direct provision of health and education facilities; it may take a long time to increase the incomes of the poor so that they can afford basic needs; in any case, the poor tend not to spend their income wisely and certain facilities such as water supply and sanitation can only be provided publicly; lastly, it is difficult to help all the poor in a uniform way in the absence of the provision of basic needs.

While these arguments undoubtedly contained an element of truth, there was some suspicion within the developing countries themselves that the international propagation of this new doctrine was an attack on their sovereignty and would alter the nature of international assistance in such a way as to make the structural transformation of their economies in the direction of industrial development more difficult. There may be a genuine dilemma here, and a trade-off between growth and basic needs. It depends on whether the scale of resource transfer increases as the allocation is changed and on the degree of complementarity between the two strategies. On the one hand it can be argued that the provision of basic needs is a form of consumption transfer – away from investment – so that growth will be retarded and the basic needs strategy will then not be sustainable in the long run. On the other hand it can be argued that the provision of basic needs is a form of investment in human capital, which may be as productive as investment in industry.

Whatever the conflict here, it can also be argued, as Singh (1979) does convincingly, that there must be an important complementarity and interrelationship between meeting basic needs, industrialisation and accelerated structural change, and both strategies need to be, and can be, pursued side by side. Specifically, that to meet basic needs on a sustainable basis it is necessary for productive structures to be transformed in favour of industry, and that a properly conceived basic needs strategy which achieves a more equitable distribution of income should help industrialisation.

The International Labour Organisation (ILO) has emphasised in its various publications (see, for example, *Meeting Basic Needs*) that the satisfaction of basic needs depends crucially on the establishment of a New International Economic Order, which according to the **Lima Declaration** of 1975 has as its aim to increase the developing countries' share of world manufacturing output to 25 per cent by the year 2000 (compared to 15 per cent today). Singh shows that the provision of basic needs on a sustainable basis requires accelerated growth of 7–8 per cent per annum, which in turn implies a growth of manufacturing output of 10 to 11 per cent. This is the rate of growth of manufacturing needed to reach the Lima target of a 25 per cent share of world manufacturing output by the year 2000. Thus the basic needs strategy and structural transformation in the direction of industry lead to the same conclusion as far as industrial growth is concerned. Whether both *objectives* are achieved largely depends on the overall economic *strategy* pursued. The experience of several countries shows that the rapid development of industry and the provision of basic needs are quite compatible. China has achieved remarkable progress in both directions by recognising the importance of gearing industrial development to the needs of agriculture and the rural sector, by encouraging the use of modern inputs into agriculture and by encouraging the development of small scale rural industries. Other, non-socialist, countries have a good record in the provision of basic needs judged by the level of life-expectancy in relation to *per capita* income. These tend to be societies where income is more equitably distributed or which make special provision, such as Sri Lanka. Countries with a poor performance in the provision of basic needs illustrate that a basic needs strategy needs to be comprehensive, otherwise failure in one respect will nullify progress in others.[1]

World Bank lending for poverty alleviation programmes rose quite dramatically during the 1970s and 1980s. The amount spent on poverty alleviation programmes rose from US $500 million in 1970 to $3300 million in 1989, or from 8 to 20 per cent of the total lending programme. Of the total in 1989, $1800 million was spent on basic needs including education, health and water supply compared to $340 million in 1970. The rest was spent on rural development and small-scale industrial projects. Industry's share of total lending remained at just over 30 per cent; while the share of total lending going to infrastructure fell from 58 per cent to 37 per cent between 1970 and 1989.

■ Human Development Index

In 1990, the United Nations Development Programme (UNDP) produced its first annual Human Development Report which gives alternative measures of the economic well-being or progress of nations which do not necessarily accord with the usual measure of the level or growth of income per head. As the UNDP Report says 'although GNP growth is absolutely necessary to meet all essential human objectives, countries differ in the way that they translate growth into human development'. The UNDP defines human development as a process of 'enlarging people's choices'. This depends not only on income but also on social indicators such as health provision, education, leisure time and so on. The UNDP thus constructs a **Human Development Index** which combines a measure of income per head with measures of life expectancy and adult literacy. Countries are then ranked by the index and compared with their income per head ranking. The results are shown in **Table 1.9**, ranking from lowest to highest. It can be seen that some countries that rank low by *per capita* income rank high by the human development index, and vice versa. In the former category of countries are: Costa Rica, Cuba, Mexico, Venezuela, Jamaica, China, Chile, Uruguay and Sri-Lanka. In the latter category of countries, note that the United States ranks only 19th on the human development index, but second according to the level of *per capita* income. Other rich countries which score low on human development are Kuwait, United Arab Emirates, Libya and Saudi Arabia.

The Human Development Index (HDI) is constructed as follows. First a deprivation index is constructed for each of the three variables – *per capita* income, life expectancy and adult literacy. The deprivation index is measured as the difference between the desirable (maximum) value of the index minus the actual value of the index divided by the difference between the desirable (maximum) and minimum values of the index (those actually observed across countries). The bigger the difference between desirable and actual, the higher the degree of deprivation. The deprivation indices are then averaged, and the human development index is taken as 1 – average deprivation index. To give an example: if the maximum (desirable) adult literacy index is 100 per cent, the

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[1] For an evaluation of country experience, and of the complementarities and trade-offs in the provision of basic needs, see Streeten *et al.* (1981), and Stewart (1985).

Table 1.9 *Human Development Index*

	Life expectancy at birth (years)'87	*Adult literacy rate (%)'85*	*Real GDP per head (PPP-adj'd)'87, $*	*HDI*	*Rank by GNP per head*	**Rank by HDI**
Niger	45	14	452	0.116	20	**1**
Mali	45	17	543	0.143	15	**2**
Burkina Faso	48	14	500	0.150	13	**3**
Sierra Leone	42	30	480	0.150	27	**4**
Chad	46	26	400	0.157	4	**5**
Guinea	43	29	500	0.162	31	**6**
Somalia	46	12	1 000	0.200	23	**7**
Mauritania	47	17	840	0.208	40	**8**
Afghanistan	42	24	1 000	0.212	17	**9**
Benin	47	27	665	0.224	28	**10**
Burundi	50	35	450	0.235	18	**11**
Bhutan	49	25	700	0.236	3	**12**
Mozambique	47	39	500	0.239	10	**13**
Malawi	48	42	476	0.250	7	**14**
Sudan	51	23	750	0.255	32	**15**
Central African Republic	46	41	591	0.258	29	**16**
Nepal	52	26	722	0.273	8	**17**
Senegal	47	28	1 068	0.274	43	**18**
Ethiopia	42	66	454	0.282	1	**19**
Zaire	53	62	220	0.294	5	**20**
Rwanda	49	47	571	0.304	26	**21**
Angola	45	41	1 000	0.304	58	**22**
Bangladesh	52	33	883	0.318	6	**23**
Nigeria	51	43	668	0.322	36	**24**
Yemen Arab Rep.	52	25	1 250	0.328	47	**25**
Liberia	55	35	696	0.333	42	**26**
Togo	54	41	670	0.337	24	**27**
Uganda	52	58	511	0.354	21	**28**
Haiti	55	38	775	0.356	34	**29**
Ghana	55	54	481	0.360	37	**30**
Yemen, PDR	52	42	1 000	0.369	39	**31**
Côte d'Ivoire	53	42	1 123	0.393	52	**32**
Congo	49	63	756	0.395	59	**33**
Namibia	56	30	1 500	0.404	60	**34**
Tanzania	54	75	405	0.413	12	**35**
Pakistan	58	30	1 585	0.423	33	**36**
India	59	43	1 053	0.439	25	**37**
Madagascar	54	68	634	0.440	14	**38**
Papua New Guinea	55	45	1 843	0.471	50	**39**
Kampuchea, Dem.	49	75	1 000	0.471	2	**40**
Cameroon	52	61	1 381	0.474	64	**41**
Kenya	59	60	794	0.481	30	**42**
Zambia	54	76	717	0.481	19	**43**
Morocco	62	34	1 761	0.489	48	**44**
Egypt	62	45	1 357	0.501	49	**45**
Laos	49	84	1 000	0.506	9	**46**
Gabon	52	62	2 068	0.525	93	**47**
Oman	57	30	7 750	0.535	104	**48**
Bolivia	54	75	1 380	0.548	44	**49**
China	70	69	2 124	0.716	22	**66**
Libya	62	66	7 250	0.719	103	**67**
South Africa	61	70	4 981	0.731	82	**68**
Lebanon	68	78	2 250	0.735	78	**69**
Mongolia	64	90	2 000	0.737	57	**70**
Nicaragua	64	88	2 209	0.743	54	**71**
Turkey	65	74	3 781	0.751	71	**72**
Jordan	67	75	3 161	0.752	76	**73**
Peru	63	85	3 129	0.753	74	**74**
Ecuador	66	83	2 687	0.758	68	**75**
Iraq	65	89	2 400	0.759	96	**76**
United Arab Emirates	71	60	12 191	0.782	127	**77**
Thailand	66	91	2 576	0.783	55	**78**
Paraguay	67	88	2 603	0.784	65	**79**
Brazil	65	78	4 307	0.784	85	**80**
Mauritius	69	83	2 617	0.788	75	**81**
North Korea	70	90	2 000	0.789	67	**82**
Sri Lanka	71	87	2 053	0.789	38	**83**
Albania	72	85	2 000	0.790	61	**84**
Malaysia	70	74	3 849	0.800	80	**85**
Colombia	65	88	3 524	0.801	72	**86**
Jamaica	74	82	2 506	0.824	62	**87**
Kuwait	73	70	13 843	0.839	122	**88**
Venezuela	70	87	4 306	0.861	95	**89**
Romania	71	96	3 000	0.863	84	**90**
Mexico	69	90	4 624	0.876	81	**91**
Cuba	74	96	2 500	0.877	66	**92**
Panama	72	89	4 009	0.883	88	**93**
Trinidad and Tobago	71	96	3 664	0.885	100	**94**
Portugal	74	85	5 597	0.899	94	**95**
Singapore	73	86	12 790	0.899	110	**96**
South Korea	70	95	4 832	0.903	92	**97**
Poland	72	98	4 000	0.910	83	**98**
Argentina	71	96	4 647	0.910	89	**99**
Yugoslavia	72	92	5 000	0.913	90	**100**
Hungary	71	98	4 500	0.915	87	**101**
Uruguay	71	95	5 063	0.916	86	**102**
Costa Rica	75	93	3 760	0.916	77	**103**
Bulgaria	72	93	4 750	0.918	99	**104**
USSR	70	99	6 000	0.920	101	**105**
Czechoslovakia	72	98	7 750	0.931	102	**106**
Chile	72	98	4 862	0.931	73	**107**
Hongkong	76	88	13 906	0.936	111	**108**
Greece	76	93	5 500	0.949	98	**109**
East Germany	74	99	8 000	0.953	115	**110**
Israel	76	95	9 182	0.957	108	**111**
USA	76	96	17 615	0.961	129	**112**
Austria	74	99	12 386	0.961	118	**113**
Ireland	74	99	8 566	0.961	106	**114**

Table 1.9 ***Human Development Index (continued)***

	Life expectancy at birth (years)'87	*Adult literacy rate (%)'85*	*Real GDP per head (PPP-adj'd)'87, $*	*HDI*	*Rank by GNP per head*	**Rank by HDI**
Burma	61	79	752	0.561	11	50
Honduras	65	59	1 119	0.563	53	51
Zimbabwe	59	74	1 184	0.576	45	52
Lesotho	57	73	1 585	0.580	35	53
Indonesia	57	74	1 660	0.591	41	54
Guatemala	63	55	1 957	0.592	63	55
Vietnam	62	80	1 000	0.608	16	56
Algeria	63	50	2 633	0.609	91	57
Botswana	59	71	2 496	0.646	69	58
El Salvador	64	72	1 733	0.651	56	59
Tunisia	66	55	2 741	0.657	70	60
Iran	66	51	3 300	0.660	97	61
Syria	66	60	3 250	0.691	79	62
Dominican Rep.	67	78	1 750	0.699	51	63
Saudi Arabia	64	55	8 320	0.702	107	64
Philippines	64	86	1 878	0.714	46	65
Spain	77	95	8 989	0.965	105	115
Belgium	75	99	13 140	0.966	116	116
Italy	76	97	10 682	0.966	112	117
New Zealand	75	99	10 541	0.966	109	118
West Germany	75	99	14 730	0.967	120	119
Finland	75	99	12 795	0.967	121	120
Britain	76	99	12 270	0.970	113	121
Denmark	76	99	15 119	0.971	123	122
France	76	99	13 961	0.974	119	123
Australia	76	99	11 782	0.978	114	124
Norway	77	99	15 940	0.983	128	125
Canada	77	99	16 375	0.983	124	126
Holland	77	99	12 661	0.984	117	127
Switzerland	77	99	15 403	0.986	130	128
Sweden	77	99	13 780	0.987	125	129
Japan	78	99	13 135	0.996	126	130

minimum is 50 per cent, and the actual is 70 per cent, then literacy deprivation is measured as (100 − 70) / (100 − 50) = 30/50 = 0.6. If this was the only index, the HDI would be 1 − 0.6 = 0.4.

■ The Stages of Development

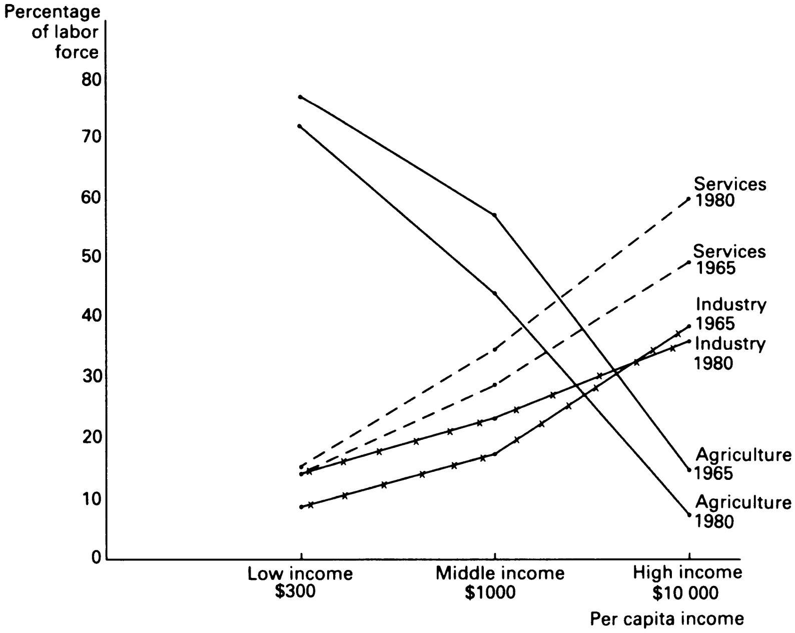
It is often argued that countries pass through phases during the course of development and that by identifying these stages, according to certain characteristics, a country can be deemed to have reached a certain stage of development. The simplest stage theory is the sector thesis of Fisher ((1933) and (1939)) and Clark (1940), who employ the distinction between primary, secondary and tertiary production as a basis of a theory of development. Countries are assumed to start as primary producers and then, as the basic necessities of life are met, resources shift into manufacturing or secondary activities. Finally, with rising income, more leisure and an increasingly saturated market for manufactured goods, resources move into service or tertiary activities producing 'commodities' with a high income elasticity of demand.

Naturally enough in this schema, the developing countries get identified with primary production, the more developed countries with the production of manufactured goods, and the mature developed economies with a high percentage of their resources in the service sector. There can be no dispute that resource shifts are an integral part of the development process, and that one of the main determinants of these shifts is a difference in the income elasticity of demand for commodities and changes in elasticity as development proceeds. But just as care must be taken to equate (without qualification) development and welfare with the level of *per capita* income, so, too, caution must be exercised in identifying different degrees of underdevelopment, industrialisation and maturity with some fairly rigid proportion of resources engaged in different types of activity. Such an association would ignore the doctrine of comparative advantage which holds that countries will specialise in the production of those commodities in which they have a relative advantage as determined by natural or acquired resource endowments. The fact that one country produces predominantly agricultural products while another produces mainly manufactured goods need not imply that they are at different stages of development on any of the conventional definitions of development we gave earlier. Such an association would also ignore the different types of service activities which may exist at different stages of a country's history. There are three broad categories of service activities, and the determinants of resource allocation to service activities accompanying development may operate differently on each in an offsetting manner. Newer service activities linked with the growth of leisure and high mass consumption tend to have a very high income elasticity of demand; services linked to the growth of manufacturing also grow but at a declining rate, and traditional services of pre-industrial times decline (Katouzian (1970)). In short, tertiary production is an aggregation of many dissimilar service activities some of which are related to low *per capita* incomes and some to high *per capita* incomes. Thus the same proportion of total resources devoted to services may be associated with very different levels of development.

Ideally a criterion of development stages is required which leaves the proportion of resources employed in different activities out of account. One possibility is to argue that a country has reached a developed state when productivity in the agricultural sector matches productivity in the industrial sector, and that it has reached a state of maturity when productivity in all sectors, including services, is approximately equal provided the level is reasonably high. The alternative is simply to classify countries as industrial, semi-industrial and non-industrial, using as a criterion for division some level of the net value of manufacturing production per head of the total population combined perhaps with an indicator of the degree of industrialisation of exports (see Maizels, 1963).

Having said all this, however, the fact remains that there is a good deal of empirical support for the Fisher–Clark view that the pattern of development across countries evidences many common characteristics, especially the shift of resources from agriculture to industry. **Figure 1.3** shows the proportions of the labour force engaged in agricul-

Figure 1.3 *Labor Force Distribution*



ture, industry and services between low-income, middle-income and industrialised countries, and over time. One sees the broad thesis of Fisher and Clark confirmed. In the low-income countries over 70 per cent of the labour force on average is employed in agriculture, while only 10 per cent is employed in industry. By contrast in the industrial market economies only 7 per cent on average is employed in agriculture and 35 per cent in industry. The proportion of the labour force in services is also relatively low in low-income countries compared to more mature industrial countries, although there is quite a wide variation between low-income countries. Over time, there is a noticeable reduction in the proportion of the labour force in agriculture in most countries, but particularly in the industrial market economies. There is a slight increase in the importance of industry in the low- and middle-income countries, but not in the industrial market economies where on average the shift of resources has been away from both agriculture *and* industry towards services, which employ on average over one half of the labour force. Generally speaking the lower the *per capita* income, the higher the proportion of the labour force in agriculture, and the higher the level of *per capita* income, the higher the proportion in services.

What is true of the sectoral distribution of the labour force is also true of the sectoral distribution of output, although the magnitude of the proportions differ because productivity differs markedly between sectors (see **Table 1.10**). Because productivity tends to be lower in agriculture than in industry, except in some special cases such as Australia and Canada, the proportion of total output generated by agriculture tends to be lower than its share of the labour force, and the proportion generated by industry tends to be higher than its share of the labour force. (See also Cody, Hughes and Wall (1980).)

Chenery and others (Chenery (1960) and (1979), Chenery and Syrquin (1975)) have documented the changing sectoral share of output using regression analysis. Using an estimating equation of the form $\log V = \log a + b \log Y$, where V is value-added *per capita* and Y is *per capita* income, it is possible to make estimates of the income elasticity of demand for different commodities (given by b). An income elasticity of demand for a good less than unity would imply that its proportional importance in total output would decline as income grows. Conversely, an income elasticity greater than unity means that its relative importance in total output will increase. Taking this basic equation (with some modifications), and applying it to a cross section of 51 countries, Chenery found that the growth elasticity of the agricultural sector is less than 0.5, while for industry it is over 1.3 and for services it is approximately unity. Within the industrial sector, there will also be differences in the income elasticity of demand for products which will cause the pattern of industry to change as development proceeds. The most notable demand shift is the relative switch from basic necessities like food, beverages and clothes to capital and consumer durable goods.

■ Industrialisation and Growth

The importance attached to industrialisation by developing countries lies in the close association that appears to exist between industrialisation and real income per head, and between the growth of industry and the growth of output as a whole. This latter observed relationship is summed up in the maxim 'manufacturing as the engine of growth'. If we relate the average growth of gross domestic product (g_{GDP}) to the average growth of manufacturing industry (g_{I}) over the period 1970–77 for 81 countries, the following regression equation is obtained:

$$g_{\text{GDP}} = 1.414 + \underset{(0.051)}{0.569}\, g_{\text{I}} \qquad r^2 = 0.610$$

This is a highly significant relationship and is confirmed by many other studies.[1] Since the regression coefficient is significantly less than unity,

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[1] See the Symposium on Kaldor's growth laws edited by the present author in *Journal of Post-Keynesian Economics*, Spring 1983.

Table 1.10 ***Structure of Production***

	Distribution of gross domestic product (per cent)							
	Agriculture		*Industry*		*Manufacturing*		*Services, etc.*	
	1965	*1990*	*1965*	*1990*	*1965*	*1990*	*1965*	*1990*
Low-income economies	41 *w*	31 *w*	26 *w*	36 *w*	19 *w*	27 *w*	32 *w*	35 *w*
China and India	41 *w*	29 *w*	29 *w*	36 *w*	22 *w*	30 *w*	30 *w*	35 *w*
Other low-income	42 *w*	30 *w*	20 *w*	34 *w*	8 *w*	..	38 *w*	38 *w*
Mozambique	..	65	..	15	..	..	..	21
Tanzania	46	59	14	12	8	10	40	29
Ethiopia	58	41	14	17	7	11	28	42
Somalia	71	65	6	9	3	5	24	26
Nepal	65	60	11	14	3	5	23	26
Chad	42	38	15	17	12	14	43	45
Bhutan	..	43	..	27	..	10	..	29
Malawi	50	33	13	20	..	14	37	46
Bangladesh	53	38	11	15	5	9	36	46
Burundi	..	56	..	15	..	10	..	29
Zaire	20	30	32	33	..	13	48	36
Uganda	52	67	13	7	8	4	35	26
Madagascar	25	33	14	13	..	12	61	54
Sierra Leone	34	32	28	13	6	6	38	55
Mali	65	46	9	13	5	8	25	41
Nigeria	55	36	12	38	5	7	33	25
Niger	68	36	3	13	2	5	29	51
Rwanda	75	38	7	22	2	15	18	40
Burkina Faso	37	32	24	24	11	14	39	44
India	44	31	22	29	16	19	34	40
Benin	59	37	8	15	..	7	33	48
China	38	27	35	42	28	38	27	31
Kenya	35	28	18	21	11	11	47	51
Pakistan	40	26	20	25	14	17	40	49
Ghana	44	48	19	16	10	9	38	37
Central African Rep.	46	42	16	17	4	..	38	41
Togo	45	33	21	22	10	9	34	46
Zambia	14	17	54	55	6	43	32	29
Guinea	..	28	..	33	..	4	..	39
Sri Lanka	28	26	21	26	17	15	51	48
Mauritania	32	26	36	29	4	..	32	44
Lesotho	65	24	5	30	1	14	30	46
Indonesia	51	22	13	40	8	20	36	38

Table 1.10 ***Structure of Production (continued)***

	Distribution of gross domestic product (per cent)							
	Agriculture		*Industry*		*Manufacturing*		*Services, etc.*	
	1965	*1990*	*1965*	*1990*	*1965*	*1990*	*1965*	*1990*
Honduras	40	23	19	24	12	16	41	53
Egypt, Arab Rep.	29	17	27	29	..	16	45	53
Middle-income economies	**19 *w***	**12 *w***	**34 *w***	**37 *w***	**20 *w***	..	**46 *w***	**50 *w***
Lower-middle-income	**22 *w***	**17 *w***	**32 *w***	**31 *w***	**20 *w***	..	**44 *w***	**50 *w***
Bolivia	23	24	31	32	15	13	46	44
Zimbabwe	18	13	35	40	20	26	47	47
Senegal	25	21	18	18	14	13	56	61
Philippines	26	22	27	35	20	25	47	43
Côte d'Ivoire	47	47	19	27	11	..	33	26
Dominican Rep.	23	17	22	27	16	13	55	56
Papua New Guinea	42	29	18	31	..	12	41	40
Guatemala	..	26	..	19	..	..	..	55
Morocco	23	16	28	33	16	18	49	51
Cameroon	33	27	20	28	10	*13*	47	46
Ecuador	27	13	22	42	18	23	50	45
Syrian Arab. Rep.	29	28	22	22	..	..	49	50
Congo	19	13	19	39	..	7	62	48
El Salvador	29	11	22	21	18	19	49	67
Paraguay	37	28	19	23	16	23	45	49
Peru	18	7	30	37	17	27	53	57
Jordan	..	8	..	26	..	12	..	66
Colombia	27	17	27	32	19	21	47	51
Thailand	32	12	23	39	14	26	45	48
Tunisia	22	16	24	32	9	17	54	52
Jamaica	10	5	37	46	17	20	53	49
Turkey	34	18	25	33	16	24	41	49
Romania	..	18	..	48	..	..	..	34
Poland	..	14	..	36	..	..	..	50
Panama	18	10	19	9	12	*7*	63	80
Costa Rica	24	16	23	26	..	19	53	58
Chile	9	..	40	..	24	..	52	..
Botswana	34	*3*	19	*57*	12	6	47	*40*
Algeria	..	13	..	47	..	12	..	41
Bulgaria	..	18	..	52	..	..	..	31
Mauritius	16	12	23	33	14	24	61	55
Malaysia	28	..	25	..	9	..	47	..
Argentina	17	13	42	41	33	..	42	45

Table 1.10 ***Structure of Production (continued)***

	Distribution of gross domestic product (per cent)							
	Agriculture		*Industry*		*Manufacturing*		*Services, etc.*	
	1965	*1990*	*1965*	*1990*	*1965*	*1990*	*1965*	*1990*
Iran, Islamic Rep.	26	21	36	21	12	8	38	58
Angola	..	*13*	..	*44*	..	*4*	..	*43*
Lebanon	12	..	21	..	..	..	67	..
Mongolia	..	17	..	34	..	..	..	49
Namibia	..	*11*	..	*38*	..	*5*	..	*50*
Nicaragua	25	..	24	..	18	..	51	..
Yemen, Rep.	..	20	..	28	..	8	..	47
Upper-middle-income	**16 *w***	**9 *w***	**36 *w***	**40 *w***	**19 *w***	**25 *w***	**47 *w***	**51 *w***
Mexico	14	9	27	30	20	23	59	61
South Africa	10	5	41	44	24	26	48	51
Venezuela	6	6	40	50	..	20	55	45
Uruguay	18	11	35	34	..	28	47	55
Brazil	19	10	33	39	26	26	48	51
Hungary	..	12	..	32	..	27	..	56
Yugoslavia	23	12	42	48	..	..	35	40
Czechoslovakia	..	*8*	..	*56*	..	..	..	*36*
Gabon	26	9	34	49	7	7	40	42
Trinidad and Tobago	8	3	48	48	..	13	44	49
Portugal	..	..	..	..	..	..	..	..
Korea, Rep.	38	9	25	45	18	31	37	46
Greece	24	*17*	26	*27*	16	*14*	49	*56*
Saudi Arabia	8	*8*	60	*45*	9	9	31	*48*
Iraq	18	..	46	..	8	..	36	..
Libya	5	..	63	..	3	..	33	..
Oman	61	*3*	23	*80*	0	*4*	16	*18*
High-income economies	**5 *w***	..	**43 *w***	..	**32 *w***	..	**54 *w***	..
OECD members	**5 *w***	..	**43 *w***	..	**32 *w***	..	**54 *w***	..
Other	..	..	..	..	..	..	..	..
Ireland	..	..	..	..	..	..	..	..
Israel	..	..	..	..	..	..	..	..
Spain	..	..	..	..	..	..	..	..
Singapore	3	0	24	37	15	29	74	63
Hong Kong	2	*0*	40	26	24	*18*	58	*73*

Table 1.10 ***Structure of Production (continued)***

	Distribution of gross domestic product (per cent)							
	Agriculture		*Industry*		*Manufacturing*		*Services, etc.*	
	1965	*1990*	*1965*	*1990*	*1965*	*1990*	*1965*	*1990*
New Zealand	. .	*9*	. .	*27*	. .	*19*	. .	*65*
Belgium	. .	*2*	. .	*31*	. .	*23*	. .	*67*
United Kingdom	3	. .	46	. .	34	. .	51	. .
Italy	. .	*4*	. .	*33*	. .	*23*	. .	*63*
Australia	9	*4*	39	*31*	26	*15*	51	*64*
Netherlands	. .	*4*	. .	*31*	. .	*20*	. .	*65*
Austria	9	*3*	46	*37*	33	*27*	45	*60*
France	. .	*4*	. .	*29*	. .	*21*	. .	*67*
United Arab Emirates	. .	*2*	. .	*55*	. .	*9*	. .	*43*
Canada	6	. .	40	. .	26	. .	54	. .
United States	3	. .	38	. .	28	. .	59	. .
Denmark	9	*5*	36	*28*	23	*19*	*55*	*67*
Germany	4	*2*	53	*39*	40	*31*	43	*59*
Norway	. .	. .	. .	. .	. .	. .	. .	. .
Sweden	. .	*3*	. .	*35*	. .	*24*	. .	*62*
Japan	10	*3*	44	*42*	34	*29*	46	*56*
Finland	16	*6*	37	*36*	23	*23*	47	*58*
Switzerland	. .	. .	. .	. .	. .	. .	. .	. .
Kuwait	0	*1*	70	*56*	3	*9*	29	*43*
World	**10 w**	. .	**41 w**	. .	**30 w**	. .	**51 w**	. .

w means weighted averages.
Source: *World Development Report 1992.*

the equation also implies that the greater the *excess* of manufacturing output growth over the rate of growth of the economy as a whole, the faster the overall growth rate will be. Setting $g_{\mathrm{GDP}} = g_{\mathrm{I}}$ gives the growth rate which divides those countries where industry is growing faster than overall output and those countries where industry is growing slower. In the above sample, that growth rate is 3.3 per cent (i.e. 1.414/(1 − 0.569)).

There are two good reasons for expecting a strong relation between the growth of manufacturing industry and the growth of the overall economy. The first is that productivity growth in industry is closely related to the growth of manufacturing output itself owing to the existence of increasing returns, both static and dynamic. Static returns relate to the size and scale of production units and are a characteristic largely of manufacturing where in the process of doubling the linear dimensions of equipment, the surface increases by the square and the volume by the cube. Dynamic economies refer to increasing returns brought about by 'induced' technical progress, learning by doing, external economies in production and so on. Manufacturing seems to be the sector where major cost saving, technical advances take place. The relationship between the growth of productivity and the growth of industry is sometimes referred to in the literature as **Verdoorn's Law.** This relationship can provide the basis of models of geographic dualism (see Chapter 5). The second induced effect that manufacturing growth has on overall growth is that the faster manufacturing grows, the faster the rate of transference of labour from other sectors of the economy where there is either diminishing returns or where no relationship exists between employment growth and output growth because there is already surplus labour. In both cases, a reduction in the amount of labour in these sectors will raise productivity growth outside manufacturing.

The question then is: what determines the rate of growth of manufacturing? In the early stages of development the impetus to industrialisation must come from the agricultural sector which provides the main source of autonomous demand for industrial goods. In the later stages of development, the demand for industrial goods from outside the country becomes of prime importance for maintaining the momentum of industrial growth. We will develop and elaborate these points later when we consider the role of agriculture in development in Chapter 3 and the idea of export-led growth in Chapters 5 and 15.

Will Developing Countries Ever Catch Up?

If living standards are largely determined by the level and growth of productivity in industry, the interesting question is whether the developing countries will ever catch up with the performance of the advanced industrialised countries. It is sometimes argued that the larger the gap between a country's technology, productivity and *per capita* income on the one hand and the level of productivity in the advanced countries on the other, the greater the scope for a poor country to absorb existing technology and to 'catch up' with richer countries. In other words, a process of convergence is predicted. One test is to do a simple correlation between the level of productivity or *per capita* income and the growth rate of countries. A strong negative correlation would be evidence of convergence.

The results of testing the catch-up hypothesis are mixed. A study by Baumol (1986) shows a strong inverse correlation between a country's productivity level and its average growth of productivity among industrialised countries and those at an intermediate stage of development, but there is no evidence of convergence as far as the poorer countries are concerned. Another study of 113 countries by Dowrick (1992) shows that while there is some evidence of catch-up in the sense that growth rates are negatively related to initial levels of productivity, other differences have caused *per capita* income growth to be faster the higher the level of *per capita* income, producing a divergence in living standards across the world (as we saw earlier in the chapter). Countries with higher levels of income have had higher investment ratios and a faster growth of the workforce which has contributed to a faster growth of output.

Clearly a productivity gap itself is not a sufficient condition for catch up. There have to be the cooperating factors to enable poor countries to take advantage of the more advanced technology available, and they have to innovate as well.

Rostow's Stages of Growth

Interest in stage theories of development was given new impetus with the publication of Rostow's book *The Stages of Economic Growth* (1960), which represents an ambitious attempt to provide an alternative to the Marxist interpretation of history – hence its subtitle 'A Non-Communist Manifesto'. Rostow presents a political theory as well as a descriptive economic study of the pattern of the growth and development of nations. A brief summary of his main points will provide a useful introduction to the next few chapters on the sources of growth and development.

The essence of the Rostow thesis is that it is logically and practically possible to identify stages of development and to classify societies according to those stages. He distinguishes five such stages:

traditional, transitional, take-off, maturity and high mass consumption.

All we need say about traditional societies is that for Rostow the whole of the pre-Newtonian world consisted of such societies; for example, the dynasties of China, the civilisations of the Middle East, the Mediterranean and medieval Europe, etc. Traditional societies are characterised by a ceiling on productivity imposed by the limitations of science. Traditional societies are thus recognisable by a very high proportion of the work-force in agriculture (greater than 75 per cent), coupled with very little mobility or social change, great divisions of wealth and decentralised political power. Today there are very few, if any, societies that one would class as traditional. Most societies emerged from the traditional stage, as described by Rostow, some time ago, mainly under the impact of external challenge and aggression or nationalism. The exceptions to the pattern of emergence from the traditional state are those countries which Rostow describes as having been 'born free', such as the United States and certain British dominions. Here the preconditions of 'take-off' were laid in more simple fashion by the construction of social overhead capital and the introduction of industry from abroad. But for the rest of the world, change was much more basic and fundamental, consisting not only of economic transformation but also a political and social transition from feudalism.

The stage between feudalism and take-off Rostow calls the transitional stage. The main economic requirement in the transition phase is that the level of investment should be raised to at least 10 per cent of national income to ensure self-sustaining growth. (On this particular point, as we shall see, there seems to be very little difference between the transition stage and the later stage of take-off.) The main direction of investment must be in transport and other social overhead capital to build up society's infrastructure. The preconditions of a rise in the investment ratio consist of a willingness of people to lend risk capital, the availability of men willing and able to be entrepreneurs and to innovate, and the willingness of society at large to operate an economic system geared to the factory and the principle of the division of labour.

On the social front a new elite must emerge to fabricate the industrial society and it must supersede in authority the land-based elite of the traditional society. Surplus product must be channelled by the new elite from agriculture to industry, and there must be a willingness to take risks and to respond to material incentives. And because of the enormity of the task of transition, the establishment of an effective modern government is vital. The length of the transition phase depends on the speed with which local talent, energy and resources are devoted to modernisation and the overthrow of the old order, and in this respect political leadership will have an important part to play.

Then there is the stage of take-off. The characteristics of take-off are sometimes difficult to distinguish from the characteristics of the transition stage, and this has been one bone of contention between Rostow and critics. None the less, let us describe the take-off stage as Rostow sees it – a 'stage' to which reference is constantly made in the development literature. Since the pre-conditions of take-off have been met in the transitional stage, the take-off stage is a short stage of development during which growth becomes self-sustaining. Investment must rise to a level in excess of 10 per cent of national income in order for *per capita* income to rise sufficiently to guarantee adequate future levels of saving and investment. Also important is the establishment of what Rostow calls 'leading growth sectors'. Historically, domestic finance for take-off seems to have come from two main sources. The first has been from a diversion of part of the product of agriculture by land reform and other means. The examples of Tsarist Russia and Meiji Japan are quoted, where government bonds were substituted for the landowner's claim to the flow of rent payments. A second source has been from enterprising landlords voluntarily ploughing back rents into commerce and industry.

In practice the development of major export industries has sometimes led to take-off permitting substantial capital imports. Grain in the United

States, Russia and Canada; timber in Sweden, and, to a lesser extent textiles in Great Britain are cited as examples. Countries such as the United States, Russia, Sweden and Canada also benefited during take-off from substantial inflows of foreign capital. The sector or sectors which led to the take-off seem to have varied from country to country, but in many countries railway building seems to have been prominent. Certainly improvement of the internal means of communication is crucial for an expansion of markets and to facilitate exports, apart from any direct impact on such industries as coal, iron and engineering. But Rostow argues that any industry can play the role of leading sector in the take-off stage provided four conditions are met: first, that the market for the product should be expanding fast to provide a firm basis for the growth of output; second, that the leading sector generates secondary expansion; third, that the sector has an adequate and continual supply of capital from ploughed-back profits; and last, that new production functions can be continually introduced into the sector, meaning scope for increased productivity.

Rostow contends that the beginnings of take-off in most countries can be traced to a particular sharp stimulus which has taken many different forms, such as a technological innovation or more obviously a political revolution, e.g. Germany in 1848, the Meiji restoration in Japan in 1868, China in 1949 and Indian independence in 1947. Rostow is at pains to emphasise, however, that there is no one single pattern or sequence for take-off. Thus there is no need for the developing countries today to recapitulate the course of events in, say, Great Britain, Russia or America. The crucial requirement is that the preconditions of take-off are met, otherwise take-off, whatever form it takes, will be abortive. Investment must rise to over 10 per cent of national income; one or more leading sectors must emerge; and there must exist or emerge a political, social and institutional framework which exploits the impulse to expansion. The examples are given of extensive railway building in Argentina before 1914, and in India, China and Canada before 1895, failing to initiate take-off because the full transition from a traditional society had not been made. The dates of take-off for some of the present developed countries are given as follows: Great Britain, 1783–1802; France, 1840–60; the United States, 1843–60; Germany, 1850–73; Sweden, 1868–90; Japan, 1878–1900; Russia, 1890–1914.

Then there is the stage of maturity which Rostow defines as the period when society has effectively applied the range of modern technology to the bulk of its resources. During the period of maturity new leading sectors replace the old, and Rostow sees the development of the steel industry as one of the symbols of maturity. In this respect America, Germany, France and Great Britain entered the stage of maturity roughly together.

Accompanying changes in the industrial structure will be structural changes in society such as changes in the distribution of the work-force; the growth of an urban population; an increase in the proportion of white-collar workers; and a switch in industrial leadership from the entrepreneur to the manager.

Maturity also has important political features. This is the period when nations grow confident and exert themselves – witness Germany under Bismarck and Russia under Stalin. This is also the period when fundamental political choices have to be made by society on the use to which greater wealth should be put. Should it be devoted to high mass consumption, the building of a welfare state, or to imperialist ends? The balance between these possibilities has varied over time within countries, as well as varying between countries. Ultimately, however, every nation will presumably reach the stage of high mass consumption whatever the balance of choices at the stage of maturity. Since the developing countries have no likelihood of reaching this stage in the foreseeable future, however, and only a handful of countries have reached it already, we shall not consider this fifth stage here.

Instead, let us evaluate Rostow's thesis, and consider the usefulness of this type of stage theory apart from it providing a valuable description of the development process and pinpointing some of the key growth variables. Most criticisms have hinged on whether a valid and operationally meaningful distinction can be made between stages of development, especially between the so-called transitional phase and take-off, and between take-off and maturity. Critics have attempted to argue that the characteristics that Rostow distinguishes for his different stages are not unique to those stages. Thus the demarcation between take-off and transition is blurred because the changes that take place in the transition phase also seem to take place in the take-off phase, and similarly with the demarcation between take-off and maturity.

One of the most outspoken of Rostow's critics is Kuznets, and some of his criticisms may be quoted as representative of the criticisms that Rostow has received in general. First, there is the difficulty of empirically testing the theory, which Rostow himself makes no attempt to do. For one thing there is a general lack of quantitative evidence for assertions made, and for another Rostow's description of the characteristics of some of the stages are not sufficiently specific to define the relevant empirical evidence even if data were available. With respect to the take-off stage, for example, what is a 'political, social and institutional framework which exploits the impulses to expansion in the modern sector'? Kuznets argues: 'it seems to me that Rostow . . . defines these social phenomena as a complex that produces the effect he wishes to explain and then treats this identification as if it were a meaningful identification' (Kuznets (1963), reprinted in Kuznets (1965), p. 219). Kuznets seems to be calling into question the whole of Rostow's scientific method and is claiming as unscientific the practice of observing phenomena, developing hypotheses on the basis of the phenomena, and then using the phenomena to support the hypotheses!

As regards quantitative evidence that is available for testing hypotheses, Kuznets questions Rostow's figures of investment and the incremental capital–output ratio during the take-off period in the countries studied. He says: 'Unless I have completely misunderstood Professor Rostow's definition of take-off, and its statistical characteristics, I can only conclude that the available evidence lends no support to his suggestions' (Kuznets (1965), p. 227). And on the concept of the take-off stage in general Kuznets concludes that lack of common experience typifying countries in the take-off stage, in relation to investment, etc., 'casts serious doubt on the validity of the definition of the take-off as a general stage of modern economic growth, distinct from what Professor Rostow calls the precondition, or transition, stage preceding it and the self-sustaining growth stage following it' (Kuznets (1965)). Cairncross (1961) echoes these remarks of Kuznets and appears to deliver a decisive blow when he asks what, if the various stages overlap, is the meaning of a 'stage'?

Are we to conclude from all this that Rostow's contribution is of little value? The answer to this must be in the negative; at least, much can be salvaged. While growth stage theories may be lacking in analytical power, the purpose of stage theory is not that the stages distinguished should necessarily have parallels in history, or be rigidly distinct, but to distinguish the situations in which an economy may find itself – situations which may merge into one another. While the concept of a 'stage' may be quibbled with, and stage theory dismissed as a blue-print for development, Rostow offers many extremely valuable insights into the development process. As we have seen from the work of Chenery and Maizels, development is not entirely haphazard, and there are certain features of the development process which do follow a well-ordered sequence. Moreover, there are certain development priorities which countries planning development may neglect at their peril. The importance of agriculture and the role of investment in raising the rate of growth are particularly stressed, as are certain political and sociological preconditions for development which economists are prone to forget, and which are ignored here. While emphasis on investment appears to be an unfashionable doctrine in the developed countries at present, there exists no satisfactory counter-argument to the doctrine in developing countries if capital is properly defined. If Rostow fails to provide an analytical breakthrough, he has aroused once again theoretical interest in the history and causes of the growth of the wealth of nations.

Questions for Discussion and Review

1. What are the major reasons why some countries are rich and others poor?
2. How would you measure the 'development gap'?
3. Why is the distribution of income within developing countries more unequal than in developed countries?
4. What have been the causes of growing urban unemployment in developing countries?
5. What is meant by 'income measure' of unemployment?
6. What do you understand by the 'basic needs approach' to development?
7. What are the developing countries asking for by way of a New International Economic Order?
8. Outline and discuss the feasibility of the main recommendations of the Brandt Commission Report?
9. What major structural changes take place in the course of development?
10. Is any useful purpose served by defining stages of economic growth?
11. What lessons, if any, can poor countries learn from the development experience of today's industrialised countries?
12. Is there any evidence that the developing countries are 'catching up' with the developed countries?

■ Chapter 2 ■

The Production-Function Approach to the Study of the Causes of Growth

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■ The Analysis of Growth

There are several ways in which the growth of income or output of a country may be expressed, but frequently they consist of identities which can tell us very little about the causes of growth without adequate theorising. For example, growth can be expressed as the product of a country's ratio of investment to output (I/O) and the productivity of investment ($\Delta O/I$), i.e.

$$\text{growth} = \frac{\Delta O}{O} = \frac{I}{O} \times \frac{\Delta O}{I} \tag{2.1}$$

By definition, slow growth is the product either of a low investment ratio, or a low productivity of capital, or both. It is this equation which forms the basis of the view that faster growth in developing countries requires more resources for investment, but by itself this does not constitute a theory of development.

Alternatively, income or output can be expressed as the product of the total labour force (L) and output per unit of labour (O/L), so that the *growth* of output can be expressed (approximately) as the sum of the rate of growth of the work-force ($\Delta L/L$) and the rate of growth of output per unit of labour, or labour productivity ($\Delta(O/L)/(O/L)$), i.e.

$$\text{growth} = \frac{\Delta O}{O} = \frac{\Delta L}{L} + \frac{\Delta(O/L)}{(O/L)} \tag{2.2}$$

In this formulation, slow growth is attributable by definition either to a slow rate of growth of the work-force, or to a lagging rate of growth of labour productivity, or both. Expressing growth in this way highlights the dependence of the growth of income per unit of labour (and, more important still, the growth of *per capita* income) on the growth of labour productivity, but again this approach does not constitute a theory of development. How does labour productivity grow? Is it by capital accumulation, or is it by technical progress broadly defined to include such factors as improvements in the quality of labour, improvements in the quality of capital, economies of scale, advances in knowledge, a better organisation of capital and labour in the productive process and so on? Growth identities of the type outlined cannot distinguish between such competing hypotheses. What is required is a testable model of the growth process.

The production-function approach to the measurement of growth is a response to this challenge. It is a method of approach to facilitate an understanding of the sources of growth, and to quantify the contribution of these sources to any measured growth rate. The approach has been used extensively and usefully in developed countries, and some results and conclusions from these studies will be given later. It has more recently been employed in the context of developing countries, although some would say not very fruitfully because the major sources of growth in developing countries are institutional and non-measurable. The justification for introducing the approach here is twofold. First, since it is now a widely used technique, students ought to be familiar with it, and aware of its limitations. Second, and more important, if discussions of development are to advance beyond the stage of anecdote, hunch and opinion, growth and development must be placed in an analytical framework so that hypotheses can be advanced subject to the possibility of testing. The production-function approach is a first step in this direction. Even if growth consists of more than economic inputs, it is still useful to know the rough contribution that the growth of, say, capital and labour has made to measured growth in the past, if only to put the growth debate in perspective. It must be borne in mind throughout the discussion, however, that this approach to the analysis of growth does not tell us *why* the growth of the factors of production, capital and labour, and technical progress differ between countries. The sources of growth are treated as exogenous. In practice, however, the supply of most resources to an economic system is endogenous responding to the demand for them. Capital is a produced means of production and comes from the growth of output itself; labour is very elastic in supply, and technical progress is itself partly dependent on the growth of output. Thus, while the production function approach can disaggregate any measured growth rate into various constituent growth-inducing sources and can 'explain' growth rate differences in terms of these sources, it cannot answer the more fundamental question of why labour supply, capital accumulation and technical progress grow at different rates between countries. The answer to this question must lie in differences in the strength of demand for countries' products, which in the early stages of development depends largely on the prosperity of agriculture (see Chapter 3) and in the later stages of development depends largely on the country's export performance relative to its import propensity (see Chapter 16).

Having said this, what problems does the production function approach pose? There are problems of calculation and estimation but these are not insuperable. Apart from the difficulties of specifying the sources of growth precisely, and measuring accurately both the dependent and independent variables, the main problem is a methodological one of fitting the appropriate production function to the data; that is, specifying the function relating output to inputs.

■ The Production Function

One of the desirable properties of any macroeconomic hypothesis, apart from being consistent with the observed facts, is that it should be consistent with, and derivable from, micro-economic theory. What we are calling the production-function approach to the analysis of growth in the aggregate possesses, in part, this desirable property in that it borrows the concept of the production function from the theory of the firm. Just as it can be said for a firm that output is a function of the factors of production – land, labour, capital and the level of technology (or factor efficiency) – so aggregate output can be written as a function of factor inputs and the prevailing technology, i.e.

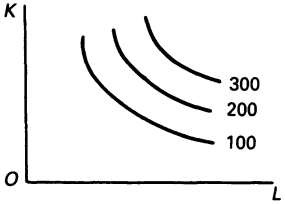
$$O = f(R, K, L, T) \tag{2.3}$$

where R is land, K is capital, L is labour and T is technology.[1]

---

[1] For the time being, the formidable problems associated with an aggregate measure of capital are ignored.

Figure 2.1



The question is how to separate empirically the contribution to growth of the growth of factor inputs from other factors which can lead to higher output, included in T, such as economies of scale (due both to technical change and to increases in factor supplies), improvements in the quality of factor inputs, advances in knowledge, better organisation of factors, and so on. The task is to fit an appropriate, correctly specified production function which, if possible, will not only separate the contribution of factor inputs to growth from the contribution of increases in output per unit of inputs (increases in 'total' factor productivity) but will also distinguish between some of the factors that may contribute to increases in the productivity of factors such as education, improvements in the quality of capital and economies of scale.

Before going on to discuss the types of function that may be employed, however, let us examine in a little more detail the properties of a production function. We have established so far that the aggregate production function expresses the functional relation between aggregate output and the stock of inputs. If land is subsumed into capital, and technology is held constant, we are left with two factors and the production function may be drawn on a two-dimensional diagram as in **Figure 2.1.** Capital (K) is measured on the vertical axis and labour (L) on the horizontal axis, and each function represents a constant level of output that can be produced with different combinations of capital and labour. The functions slope negatively from left to right on the assumption that marginal additions of either factor will increase total output – that is, factors have positive marginal products – and they are drawn convex to the origin on the assumption that factors have a diminishing marginal productivity as their supply increases so that if one unit is withdrawn it needs to be substituted by more and more of the other factor to keep output constant. The position of the functions broadly reflects the level of technology. The more 'advanced' the technology, the greater the level of output per unit of total inputs, and the closer to the origin will be the production function representing a given output.

From the simple production-function diagram it is easy to see how output may increase. First, there may be a physical increase in factor inputs, L and K, permitting a higher level of production. Either or both factors may increase. If only one factor increases, the movement to a higher production function will involve a change in the combination of factors and output will not be able to increase for ever because ultimately the marginal product of the variable factor will fall to zero. This is illustrated in **Figure 2.2**, where, with a given stock of capital OK_1, output cannot increase beyond 300 with increases in the supply of labour (OL_1, OL_2, etc.) beyond the limit indicated. The diminishing productivity of the variable factor, labour, with capital fixed, is shown by the flatter and flatter slope of the production functions at successive points, L_1, L_2, until at the limit the production function is horizontal and the marginal product of labour is zero.

If both factors increase in supply, however, there is no reason why output should not go on increasing indefinitely. In fact, if both factors increase in supply there is a possibility that production may be subject to increasing returns such that output rises more than proportionately to the

Figure 2.2

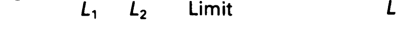
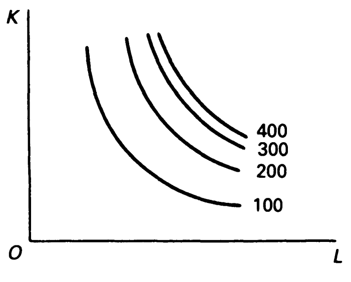


Figure 2.3



increase in combined inputs. If this is the case, output per unit of total inputs will increase and the production functions representing equal additional amounts of production, e.g. 100, 200, 300, etc., must be drawn closer and closer together as in **Figure 2.3**.

In the opposite case of decreasing returns, the functions would be drawn further and further apart. Finally, in the case of production subject to constant returns the functions would be drawn equidistant from one another.

Increasing returns may also result from advances in technology, irrespective of increases in factor supplies. These are called technological economies of scale. In this case increases in output per unit of input would have to be represented on a production-function diagram either by a relabelling of the functions or a relabelling of the axes. That is, either the same amount of factor inputs, measured on the axes, would have to be shown to be producing a higher output than before, or alternatively the same output could be shown to be produced by lesser amounts of inputs. If the functions are relabelled and not the axes, this is tantamount to a shift in all the production functions towards the origin. Shifts in the production function towards the origin are implied by all forms of technical progress or any factor which increases the productivity of the physical inputs.

In short, there are three broad sources of growth that can be distinguished using the production-function framework: first, increases in factor supplies; second, increasing returns; and third, technical progress interpreted in the wide sense of anything that increases the productivity of factors other than increasing returns.

The Cobb–Douglas Production Function

The production function most commonly fitted to aggregate data to distinguish empirically between these three broad sources of growth has been the unconstrained form of the **Cobb–Douglas production function**, named after its two American originators, Charles Cobb (a mathematician) and Paul Douglas (an economist), who pioneered research in the area of applied economic growth in the 1920s and 1930s (Cobb and Douglas (1928)). The Cobb–Douglas function may be written as

$$O_t = T_t K_t^{\alpha} L_t^{\beta} \tag{2.4}$$

where O_t is real output at time t, T_t is an index of technology, or 'total' productivity, K_t is an index of the capital stock, or capital services, at constant prices, L_t is an index of labour input (preferably man-hours), α is the partial elasticity (responsiveness) of output with respect to capital (holding labour constant), and β is the partial elasticity of output with respect to labour (holding capital constant).

It is assumed that changes in technology are exogenous and independent of changes in factor inputs, and that the effect of technical progress is neutral on the factor intensity of production (see p. 118 for a definition of neutral technical progress). T_t, α and β are constants to be estimated empirically if the function is unconstrained. If α and β are assigned values in advance of the use of the function for estimating purposes, the function is said to be constrained. Normally, α and β will be less than unity on the assumption of diminishing marginal productivity of factors. The sum of the partial elasticities of output with respect to the factors of production gives the scale of returns, or the degree of homogeneity, of the function: $\alpha + \beta = 1$ represents constant returns, $\alpha + \beta > 1$ represents increasing returns, and $\alpha + \beta < 1$ represents decreasing returns, and the function is said to be homogeneous of degree one, greater than one, and less than one, respectively.

If α and β are not estimated empirically but are assumed to sum to unity, in which case the function would be constrained to constant returns, then increasing or decreasing returns will be reflected in the value of T_t, which is the index of total factor productivity. The existence of increasing returns would bias the value of T_t upwards, and decreasing returns would bias the value of T_t downwards. These points are made because in practice the Cobb–Douglas function is often employed in this constrained form with the sum of α and β put equal to unity. Then values are assigned to α and β according to the share of capital and labour in the national income. The underlying assumption is the perfectly competitive one that if production is subject to constant returns and factors are paid the value of their marginal products, then factor shares will reflect the elasticity of output with respect to each factor.[1] Despite the fact that conditions in developed and developing economies alike are far removed from perfect competition, it is interesting to note that when α and β have been estimated empirically, values have frequently been obtained which do not diverge markedly from the estimate of factor shares of the national product. This is sometimes used, in fact, as a justification for assigning values to α and β on the basis of factor shares to save the trouble of making empirical estimates.

To use equation (2.4) for separating out the influence of the three broad sources of growth mentioned earlier, we must first make it operational by transforming it into rate-of-growth form. This can be done by taking logarithms of the variables and differentiating with respect to time, which gives:[2]

$$\frac{d \log O_t}{dt} = \frac{d \log T_t}{dt} + \alpha \frac{d \log K_t}{dt} + \beta \frac{d \log L_t}{dt} \qquad (2.5)$$

or

$$\frac{dO}{dt} \times \frac{1}{O} = \left(\frac{dT}{dt} \times \frac{1}{T}\right) + \alpha \left(\frac{dK}{dt} \times \frac{1}{K}\right) + \beta \left(\frac{dL}{dt} \times \frac{1}{L}\right)$$

The above equations are in continuous time. The discrete approximation, taking annual rates of change of the variables, may be written as:

$$r_O = r_T + \alpha r_K + \beta r_L \qquad (2.6)$$

where r_O is the annual rate of growth of output per time period, r_T is the annual rate of growth of total productivity, or technical progress, r_K is the annual rate of growth of capital, r_L is the annual rate of growth of labour, and α and β are the partial elasticities of output with respect to capital and labour, respectively, as before.

In words, equation (2.6) says that the rate of growth of output is equal to the sum of the rate of growth of 'total' productivity, the rate of growth of capital weighted by the partial elasticity of output with respect to capital and the rate of growth of labour weighted by the partial elasticity of output with respect to labour. With knowledge of r_O, r_K, r_L, α and β, it becomes possible as a first step to separate out the contribution of factor inputs to growth from increases in output per unit of inputs represented by r_T. Now let us give an illustrative example. Suppose $r_O = 5$ per cent per annum; $r_K = 5$ per cent per annum; $r_L = 1$ per cent per annum; and $\alpha = 0.25$ and $\beta = 0.75$ (decided on the basis of factor shares). Substituting in equation (2.6) we have

$$5.0 = r_T + 0.25\ (5.0) + 0.75\ (1.0) \qquad (2.7)$$

---

[1] The proof is as follows. The elasticity of output with respect to capital, α, is $(dO/O)/(dK/K) = (dO.K)/(dK.O)$. Now if capital is paid its marginal product, then $dO/dK = r$, where r is the rental on capital. Hence $\alpha = rK/O$, where rK/O is capital's share of total output. Thus under perfectly competitive assumptions the elasticity of output with respect to any factor is equal to that factor's share of total output.

[2] Alternatively, the total differential of equation (2.4) can be taken and the result divided by output, which will also convert the equation into rate-of-growth form.

The contribution of capital to measured growth is 0.25 (5.0) = 1.25 percentage points; the contribution of labour is 0.75 (1.0) = 0.75 percentage points; and r_T is left as a residual with a contribution of 3.0 percentage points. If α and β were estimated empirically, and there happened to be increasing returns ($\alpha + \beta > 1$), the significance of the factor contribution would be enhanced and r_T would be smaller.

On the assumption of constant returns to scale, the production function can also be estimated in its so-called labour-intensive form to analyse the *growth of output per head.* If we subtract r_L from both sides of equation (2.6) and assume $\alpha + \beta = 1$, so that $\beta = \alpha - 1$, we get:

$$r_O - r_L = r_T + \alpha\ (r_K - r_L) \qquad (2.8)$$

In words, equation (2.8) says that the rate of growth of output per head (or labour productivity) is equal to the sum of the rate of growth of total productivity plus the rate of growth of capital per head times the elasticity of output with respect to capital. Taking the illustrative figures above, if $r_O = 5$ per cent and $r_L = 1$ per cent, then the rate of labour productivity growth is 4 per cent. Therefore:

$$4.0 = r_T + 0.25\ (5.0 - 1.0) \qquad (2.9)$$

The contribution of capital per head (capital deepening) to productivity growth is 1 percentage point, leaving r_T with a contribution of 3 percentage points (as before).

Although r_T has been variously called technical progress, advances in knowledge, etc., definitionally it is that portion of the growth of output not attributable to increases in the factors of production, and includes the effects not only of the multifarious factors which go to increase the productivity of labour and capital but also measurement errors in the capital and labour input series. r_T is perhaps best described as a residual, or, perhaps more appropriately still, a 'coefficient of ignorance' if the analysis proceeds no further.

One important component of r_T, which can be considered the result of measurement errors, is likely to be the effect of resource shifts from less productive to more productive activities. Since the analysis is aggregative there is bound to be a confounding of changes in actual output with changes in the composition of output unless the weights used for aggregating inputs are continually revised. Resource shifts from agriculture to industry can be expected to figure prominently in any production-function study of developing countries, as they do for studies of many advanced economies.

Before considering some of the results of applying the Cobb–Douglas function to empirical data, we must briefly mention some of its limitations. Its use has come under attack on four main counts. The first criticism is that since only one combination of factor inputs can be observed at any one time, there is an identification problem in attempting to distinguish shifts in the function (technical progress) from movements along the function (changes in factor intensity) unless the assumption of neutral technical progress is made. But technical progress may not be neutral and therefore the effects of technical progress and changing factor intensity become confused, biasing the results of the contribution of factor inputs and technical progress to growth. Secondly, the assumption that technical progress is independent of increases in factor inputs has been questioned. This is not a specification error of the function itself, however, and the Cobb–Douglas function can be used making technical progress a function of the rate of growth of inputs – so-called endogenous models of technical progress. Thirdly, the Cobb–Douglas function possesses the restrictive property of constant unitary elasticity of substitution between factors whatever the factor intensity.[1]

The assumption of a constant elasticity means that the function cannot represent a change in the ease of substitution between capital and labour. The assumption of unitary elasticity may be serious if the elasticity of substitution of factors differs significantly from unity and there are wide discrepancies in the growth rate of factors. For example, if the elasticity of substitution between capital and labour is significantly less than unity and capital grows faster than labour, this will result in an overestimate of the contribution of capital to growth and an underestimate of the role of other factors. The intuitive explanation of this bias is that the smaller the elasticity of substitution the more difficult it is in practice to obtain increased output just by increasing one factor because diminishing returns set in strongly. By assuming the elasticity is higher than it is, the importance of the fastest-growing factor is exaggerated. If elasticity is high, diminishing returns are not a problem, and if both capital and labour expand at the same rate, growth is obviously independent of the elasticity of substitution.[2]

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[1] The elasticity of substitution (σ) relates the proportional change in relative factor inputs to a proportional change in the marginal rate of substitution between labour and capital

A final criticism relates to the measurement of output and inputs. What, argue some, is the meaning of a function which aggregates so many heterogeneous items; in particular, what is the meaning of an aggregation of capital goods built at different times, at different costs and with varying productivities? How are such capital goods to be equated in an aggregate measure of capital?

By and large, most of the above-mentioned criticisms are theoretical worries, the practical significance of which is hard to determine. Studies of the nature of technical progress, at least in advanced countries, suggest that the assumption of neutrality is a fair working hypothesis. The fact that technical progress may be dependent on factor accumulation can be accommodated within the Cobb–Douglas framework. Capital and labour would have to grow at very different rates for the elasticity of substitution to matter very much, but in any case studies show that it is quite close to unity. Finally, although the aggregation of heterogeneous outputs and inputs can present severe problems, especially the aggregation of capital which cannot be measured directly in physical units, there are techniques of aggregation available which various studies have used with some success.

What have been the results of applying the Cobb–Douglas function to empirical data? First, let us consider its application in developed countries and consider the conclusions that emerge. We can start with the pioneer work of Cobb and Douglas themselves. Ironically, the Cobb–Douglas function as first conceived was not intended as a device for distinguishing the sources of growth but as a test of neo-classical marginal productivity theory; that is, to see whether elasticities corresponded to factor shares. Douglas had observed that the output curve for American manufacturing industry for the period 1899–1922 lay consistently between the two curves for the factors of production, and he suggested to his mathematician friend, Cobb, that they should seek to develop a formula which could measure the relative effect of labour and capital on the growth of output over the period in question. This story is described by Douglas (1948) in his fascinating review article ‘Are There Laws of Production?’ As an insight into inductive method the relevant passage is worth quoting in full:

(MRS) (or the proportional change in the relative factor-price ratio on the basis of marginal productivity theory). The elasticity of substitution may therefore be written as

$$\sigma = \frac{\partial \log (L/K)}{\partial \log \text{MRS}}$$

The proof that $\sigma = 1$ is very simple:

$$\text{MRS} = \frac{\partial O}{\partial K} \Big/ \frac{\partial O}{\partial L} = \frac{\alpha L}{\beta K}$$

$$\log \text{MRS} = \log \frac{\alpha}{\beta} + \log \frac{L}{K}$$

Differentiating with respect to log MRS gives

$$1 = \frac{\partial \log (L/K)}{\partial \log \text{MRS}} = \sigma$$

[2] To overcome the restrictive property of the Cobb–Douglas function when the growth rates of factors do differ, it is possible to use the more general constant elasticity of substitution production function, of which the Cobb–Douglas is a special case. We cannot discuss the function here except to say that it, too, is not without its specification errors. There is still the assumption of constancy which has the drawback that one may be ascribing changes in elasticity to changes in technology which are really due to changes in factor proportions. This limitation can only be overcome with a function possessing the property of variable elasticity of substitution.

> Having computed indexes for American manufacturing of the number of workers employed by years from 1899 to 1922 as well as indexes of the amounts of fixed capital in manufacturing deflated to dollars of approximately constant purchasing power, and then plotting these on a log scale, together with the Day index of physical production for manufacturing, I observed that the product curve lay consistently between the two curves for the factors of production and tended to be approximately one-quarter of the relative distance between the curve of the index for labour, which showed the least increase in the period, and that of the index of capital which showed the most. I suggested to my friend Charles Cobb that we seek to develop a formula which could measure the relative effect of labour and capital upon product during this period. At his suggestion the sum of the exponents was tentatively made equal to unity in the formula $O = TK^{\alpha}L^{1-\alpha}$ [our notation]. . . . The fact that on the basis of fairly wide studies there is an appreciable degree of uniformity, and that the sum of the exponents approximates to unity, fairly clearly suggests that there are laws of production which can be approximated by inductive studies and that we are at least approaching them (Douglas (1948), p. 20).

The estimated function derived was $O' = 1.01\ K^{0.25}\ L^{0.75}$, which lent support to the neo-classical model of constant returns and marginal product pricing. There was no discussion of the relative importance of factors of production and the T variable in accounting for measured growth. It was not until Abramovitz in 1956 (Abramovitz (1956)) and Solow in 1957 (Solow (1957)) showed that between 80 and 90 per cent of the growth of output per head in the US economy over the century could not be accounted for by increases in capital per head that the production function started to be used in earnest as a technique in the applied economics of growth. Abramovitz remarked:

> This result is surprising in the lop-sided importance which it appears to give to productivity increase and it should be, in a sense, sobering, if not discouraging to students of economic growth. Since we know little about the causes of productivity increase, the indicated importance of this element may be taken to be some sort of measure of our ignorance about the causes of economic growth in the United States, and some sort of indication of where we need to concentrate our attention (Abramovitz (1956), p. 11).

Abramovitz's findings were supported by Solow, who found, in examining the data for the non-farm sector of the US economy for the period 1919–57, that approximately 90 per cent of the growth of output per head could not be accounted for by increases in capital per head; that is, using the notation in equation (2.8)

$$r_T/(r_O - r_L) = 0.90 \qquad (2.10)$$

The findings of Abramovitz and Solow disturbed economists brought up in the belief that investment and capital accumulation played a crucial role in the growth process. Even allowing for the statistical difficulties of computing a series of the capital stock, and the limitations of the function applied to the data (e.g. the assumptions of constant returns and neutral technical progress, plus the high degree of aggregation), it was difficult to escape from the conclusion that the growth of the capital stock was of relatively minor importance in accounting for the growth of total output. It is true that Abramovitz had stressed that his findings did not imply that resources were unimportant for growth, because of the interrelation between the growth of inputs and factors leading to increases in output per unit of inputs, but this caution was not sufficient to counter the initial reaction that capital does not matter.

It would not be misleading to say that most of the subsequent research effort in this field of growth was designed to reverse this conclusion, or rather to 'assign back' to the factors of production sources of growth which make up the residual factor but which are interrelated with, or dependent on, the growth of factor inputs. Work has proceeded on two fronts. On the one hand, attempts have been made to disaggregate the residual factor, measuring factor inputs in the conventional way; on the other hand, attempts have been made to adjust the labour and capital input series for such things as changes in the quality of factors and their composition so that much more measured growth is seen to be attributable to increases in factor inputs in the first place. For example, the labour input series has been adjusted for improvements in its quality due to the growth of education, and for changes in its composition due to age/sex shifts. Likewise, the capital stock series has been adjusted to reflect changes in its composition and, more important, to allow for the fact that new additions to the capital stock in any line of production are likely to be more productive than the existing capital stock as a result of technical advance. This is the notion of embodied or endogenous technical change as opposed to the exogenous technical change assumption of the original Cobb–Douglas function which assumes that all vintages of capital share equally in technical progress. A distinction is now made, therefore, between embodied and disembodied technical progress – embodied technical progress referring to technical improvements that can only be introduced into the productive system by new investment, and disembodied technical progress which is exogenous and not dependent on capital accumulation. There are several ways in which embodied technical progress can be isolated from the residual factor by appropriate adjustments to the capital stock series to reflect the greater productivity of the latest investments. The net result is to enhance the role of capital accumulation in the growth process.

Efforts have also been made towards overcoming one of the problems associated with the aggregation of outputs by taking explicit account of shifts of labour and capital from low-productivity to high-productivity sectors. This, too, reduces the significance of the residual factor and makes the role of labour and capital in the growth process look correspondingly more important.

Let us now look in greater detail at the modifications to the Cobb–Douglas function which can be made to allow for the quality changes discussed above, and then consider some of the empirical evidence.

■ Embodied Technical Progress

If capital is measured net at constant prices, and all ages or vintages of capital are treated alike, technical change associated with capital investment becomes part of the residual factor in the growth equation. The ultimate effect of adjusting the capital stock series for **embodied or endogenous technical change** is to raise the sensitivity of the growth rate to changes in the rate of capital accumulation. The question is, how should the adjustment take place, and how to assess the relative importance of technical change that depends on the growth of capital compared to conventional hypotheses of the role of capital? Experimenting with the embodied technical progress hypothesis is, in fact, a complicated procedure because measures of the capital stock can only be properly corrected for the effect of technical change if the rate of progress is known. Since this rate, in general, is unknown, it is necessary to work by a process of trial and error. Applied studies can be divided into those which attempt to estimate a fairly precise rate of embodied technical progress and those which simply try to assess its relative importance. As far as the latter approach is concerned, one device is to measure capital gross at current prices rather than net at constant prices. If capital is measured in this way, technical change in capital should be implicit in the price variable leaving disembodied technical change in the residual factor. Alternatively, an exponential time trend can be added to the traditional form of the production function, representing a constant rate of productivity advance, and this may be called disembodied technical progress. The residual would then consist of the effects of embodied progress. The difficulty here is that embodied technical progress may also grow exponentially if the growth of the capital stock itself is fairly constant.

A third approach, and one which in theory allows a more precise measure of the rate of embodied technical progress, is the so-called vintage approach to the measurement of capital. The procedure here is more formal and involves a consideration of the model representing the embodiment hypothesis. The vintage approach to the consideration of embodied technical progress is most associated with the name of Professor Solow. He was the first to present the economic theory upon which the vintage production function is based, and was among the first to modify the basic Cobb–Douglas function to allow for embodied technical change and to estimate its growth. Basically, the approach consists of giving a separate valuation to each year's addition to the capital stock, with a higher weight being assigned to the most recent and presumably the more productive additions. The problem is deciding the weights.

Solow's original model (1960) has estimation complications, but Nelson (1964) has produced a similar model incorporating the same features where the 'effective' capital stock is given as a function of the gross capital stock, its average age, and the rate of productivity improvement of new capital goods. Denoting the 'effective' capital stock as τ, the Cobb–Douglas function as modified for changes in the quality of capital may be written as:

$$O_t = T'_t \, \tau_t^{\alpha} L_t^{\beta} \qquad (2.11)$$

where τ is the quality-weighted sum of capital goods and T' is now an index of total productivity excluding the effect of technical progress embodied in new capital.

Assuming that technical progress improves the quality of new machines at a constant rate per annum (λ_K), then:

$$\tau_t = \sum_{0}^{t} K_{Vt}(1 + \lambda_K)^{v} \qquad (2.12)$$

where K_{Vt} is the amount of capital built in year V (of vintage V) which is still in use in time t. (K_{Vt} is gross capital of vintage V, and the variable τ_t is thus an integral value of capital with different vintages).

If the rate of growth of capital changes, this will alter the age distribution of capital and this, too, will affect the productivity of capital in that the gap between the average technology and the best-practice techniques will be changing. A decrease in the average age of capital will improve the productivity of capital by an amount equal to $-\lambda_K \Delta \bar{A}$, where $\Delta \bar{A}$ is the change in the average age of capital ($\Delta \bar{A}$ is negative if the capital stock is getting younger owing to a faster accumulation of capital).

The rate of growth of the 'effective' capital stock may therefore be written as:

$$\frac{\Delta \tau}{\tau} = \frac{\Delta K}{K} + \lambda_K - \lambda_K \, \Delta \bar{A} \qquad (2.13)$$

where $\Delta K/K$ is the rate of growth of the actual capital stock, λ_K is the rate of growth of improvement in the capital stock, and $\lambda_K \Delta \bar{A}$ is the effect of changes in the average age of the capital stock, which is a function of the investment ratio.

The Cobb–Douglas function with embodied technical progress may now be written in estimating form as

$$r_O = r_T + \alpha r_K + \alpha \lambda_K - \alpha \lambda_K \Delta \bar{A} + \beta r_L \qquad (2.14)$$

where r denotes the rate of growth of variables over time.

Equation (2.14) is derived in exactly the same way as equation (2.6) and can be interpreted in the same way.

But the question remains, how much of the measured growth rate r_O is due to embodied technical change, how much to disembodied, exogenous forces, and how much to changes in the age distribution of capital if the average age is changing? If we know the rate of growth of total productivity and the age distribution of capital, and all technical progress is assumed to be embodied, then λ_K and the effects of changing age distribution can be calculated. But it is clearly unrealistic to assume that all technical progress is embodied. How, then, is the rate of embodied progress to be estimated using the vintage approach? The method commonly employed is to experiment with different rates of embodied technical progress and, on a trial-and-error basis, choose that rate which gives the best statistical fit when the function is estimated using empirical data for the other variables. Needless to say, the technique is arbitrary, but given values for λ_K and $\lambda_K \Delta \bar{A}$, the sensitivity of output with respect to capital is increased. Improvements in the quality of capital can be regarded as equivalent to physical increases in the quantity of capital of a few extra per cent. The contribution of capital to growth is enhanced.

As far as the empirical evidence is concerned, however, there seems to be some difference of opinion among investigators as to the importance of the embodiment hypothesis. Nelson (1964) found that virtually all of the variation in growth of labour productivity in the American economy in the first half of the twentieth century can be accounted for by variations in the average age of the capital stock, as opposed to variations in λ_K even if full embodiment is assumed. On this finding the proportion of the total output of a country that is invested is crucial to growth, since the average age of capital is inversely related to the investment ratio. On the other hand, Denison (1964) has argued on several occasions that the embodiment effect operates solely through the age distribution of capital, which is subject to very small variation and cannot be important in practice. But it is not only changes in the average age of the capital stock that distinguish the 'new view' of investment from the traditional assumption that all progress is disembodied. The average age of capital may remain the same, but at the same time more productive machines may be replacing those that are wearing out. Several studies for America, which have attempted to estimate embodied technical progress by the trial-and-error procedure mentioned, arrive at annual improvement rates of between 2 and 5 per cent.

Improvements in the Quality of Labour

Criticism of the inadequate treatment of changes in the quality of capital apply equally to labour. To what extent may the role of labour in the growth process be underestimated, and the amount of 'unexplained' growth exaggerated, by ignoring changes in the quality of labour? A model analogous to that embodying technical progress in capital can be developed which embodies quality improvements in labour, although it is not strictly necessary for new additions to the labour force to be more productive than the average for the average quality to increase. The sorts of factors that increase the personal efficiency of labour, and labour productivity, operate, in general, in a disembodied way.

If we denote the improved quality of labour as qL, where q stands for the improvement in the productive efficiency of labour, changes in the quality of labour are accommodated by writing the Cobb–Douglas function as:

$$O_t = T_t^* \tau_t^{\alpha} (qL_t)^{\beta} \tag{2.15}$$

where T^* is an even narrower concept than T' by excluding from the residual improvements in the quality of labour as well as capital. q can stand both for an improvement in the average quality of labour, and an improvement in the productive efficiency of new workers due to such things as education or training. If q expresses an improvement in the productive efficiency of new workers, it is here that there is an analogy with the vintage model of capital, and it becomes necessary to express the production function not only in a form recognising an improvement in the average quality of labour but in a form which also takes account of changes in the age composition of labour. Let λ_L be the yearly rate of improvement in the average efficiency of labour and $\Delta \bar{E}$ the change in the average age of the work-force. We can then write:

$$\frac{\Delta(qL)}{(qL)} = \frac{\Delta L}{L} + \lambda_L - \lambda_L \Delta \bar{E} \tag{2.16}$$

Like τ, the growth of 'effective' labour input consists of three parts: the rate of growth of labour input in physical units ($\Delta L/L$); the average rate of growth of its improvement (λ_L); and the effect of changes in its average age ($\lambda_L \Delta \bar{E}$).

The Cobb–Douglas function, adjusted for changes in the quality of both capital and labour, now becomes (in estimating form):

$$r_O = r_T{}^* + \alpha r_K + \alpha\lambda_K - \alpha\lambda_K\Delta\bar{A} + \beta r_L + \beta\lambda_L - \beta\lambda_L\Delta\bar{E} \qquad (2.17)$$

The residual term, $r_T{}^*$, is now the rate of growth of total productivity or technical progress independent of increases in factor inputs. The effect of making allowance for improvements in the quality of labour and changes in its average age is exactly the same as in the case of capital – to increase the sensitivity of output growth to the growth of the labour force and to reduce the size of the residual factor. The two most important factors affecting the quality of labour in any economy are work experience (or learning), which primarily improves the average quality of labour, and formal education and training, which may exert their effect both through changes in the average quality of labour and its 'age' distribution if education and training expand, and primarily affect new workers. We shall discuss education and learning more fully when we consider again capital and technical progress in Chapter 4.[1]

■ Resource Shifts

In addition to improvements in the quality of inputs, an important source of productivity growth may be resource shifts from less productive to more productive activities. Unless the weights for aggregating capital and labour are continually revised to reflect their changing productivities in different occupations, the effects of resource reallocation will appear independent of the factors of production whereas, in practice, growth from this source is intimately bound up with factor endowments and the sectors in which the growth of factors of production takes place. There are two main methods of calculating the effect of resource shifts on measured growth. One method, taking labour and capital separately, is to take the difference between the marginal product in the two sectors considered and to multiply this difference by the product of the increase in the proportional importance of the factor in the sector with the highest marginal product and the share of the factor in total income. Thus, suppose labour is moving from agriculture, which is a low-productivity sector, to industry, which is a high-productivity sector, then the contribution of the transfer of labour to measured growth can be estimated as:

$$(MRPL_I - MRPL_A)\ \Delta\ SL_I\ \frac{L}{Y}$$

where $MRPL_I$ is the marginal revenue product of labour in industry, $MRPL_A$ is the marginal revenue product of labour in agriculture, ΔSL_I is the change in the proportional importance of labour in the industrial sector, and L/Y is labour's share of income.

The same procedure can be adopted for estimating the contribution of capital shifts to growth. Robinson (1971) has estimated for the period 1958–66 that the average contribution for 39 countries of capital and labour transfers between agriculture and industry to measured annual growth was 0.20 and 0.57 percentage points, respectively, giving a joint percentage contribution to the average annual growth rate of 16 per cent.

A second method is to take a weighted average of the rates of 'technical progress' *within* different individual activities and to subtract this from the aggregate measure of technical advance, leaving the difference as a measure of productivity advance due to shifts of resources *between* activities. This is not an ideal measure because the difference is bound to contain the effects of other 'errors' and omissions, but is does give some idea of the effects of aggregation. When Massell (1961) adopted this procedure in a study of nineteen American manufacturing industries over the post-war years, he found that approximately 30 per cent of the aggregate rate of technical advance was the result of aggregation. Approximately 0.1 percentage point of growth was due to labour shifts and 0.8 percentage points to capital shifts. Denison (1967) has made estimates of a similar order of magnitude for some countries of Western Europe considering only shifts of resources from agriculture to industry. From 1950 to 1962 resource shifts from agriculture to industry contributed 1.04 percentage points per annum to the growth rate of Italy, 0.76 percentage points in Germany and 0.65 percentage points in France. Indeed, it is these shifts which account in large part for the difference in the post-war growth performance of continental Europe on the one hand and the United States and Great Britain on the other. The potential scope for growth from this source in developing countries must be considerable as Robinson's work suggests. Given the size of the agricultural sector in developing countries, resource shifts into industry will be a source of growth for a considerable period in the future.

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[1] For a survey of many of the issues discussed here, see Kennedy and Thirlwall (1972).

■ Empirical Evidence

Since Abramovitz and Solow reported their findings in 1956 and 1957, a substantial body of empirical evidence relating to the sources of growth has accumulated experimenting with different specifications of the aggregate production function. Unfortunately, it is not systematic. The time periods taken, the data used, the sectors of the economy examined, and the methodology employed, all vary within and between countries. All that can be done here is to draw attention to some of the major findings and let readers check for themselves the nature of the work. Until recently most of the evidence available pertained to fairly advanced economies and it is largely from this evidence, wisely or not, that conclusions have been drawn on development strategy for developing countries. Research in developing countries has been hampered by a lack of researchers, a shortage of reliable empirical data, and perhaps an even greater suspicion of the aggregate production function, and its implicit assumptions, than in developed countries. The assumption that factor shares can be used as weights to measure the relative contribution of labour and capital to growth is probably more dubious in developing than in developed countries. The price of labour almost certainly exceeds its marginal product, while the price of capital falls short of it so that the share of income going to labour exceeds the elasticity of output with respect to labour and the share of income going to capital understates the elasticity of output with respect to capital. Second, the aggregation of inputs and outputs is generally more difficult, and there are greater problems of resource under-utilisation to contend with. The recent past, however, has witnessed a sprinkling of production-function studies for developing countries, and there are undoubtedly many more to come as more data become available. Moreover, the production function, despite its drawbacks, does yield verifiable hypotheses.

The studies for advanced countries tend to confirm the relative unimportance of capital compared with other growth-inducing variables. Even allowing for changes in the composition of capital and embodiment, capital growth rarely accounts for more than one-half of the measured growth of output. Denison, who adjusts the capital stock for changes in its composition, estimates a contribution of approximately 25 per cent in the United States over the period 1950–62 and just under 20 per cent in North-West Europe over the same period (Denison (1967)). Solow, using an embodied model, finds the weighted contribution of embodied technical progress for plant and machinery less than that of disembodied progress (Solow (1962)). One notable exception to this general rule is the case of Israel, where Gaathon (1961) finds that the growth of capital per head accounted for 60 per cent of the annual average growth of income per head over the period 1950–9. Perhaps this is a good example of the type of country that Hicks had in mind when he said that 'it is very wrong to give the impression to a [developing] country, which is very far from equilibrium even on past technology, that capital accumulation is a matter of minor importance' (Hicks (1965), p. 304). We shall discuss later good economic reasons why the growth of capital may be more important for growth in developing countries than in more mature economies.

If a country experiences a rapid rate of capital accumulation this will undoubtedly offset some of the biases against capital inherent in the production-function framework. For equal additional increases in capital and labour the factor of production showing the biggest contribution to growth will be the one with the largest partial elasticity. If labour and capital grow at the same rate, and α and β are decided on the basis of shares of the national income, the contribution of capital growth will always appear less important than labour simply because its share of the national income is smaller. This bias is greater the greater the degree of structural disequilibrium in the labour market with wages in excess of marginal product. Furthermore, when α and β are estimated empirically, there is also a tendency for the partial elasticity of output with respect to capital to be biased downwards compared with the elasticity for labour. The reason is that in estimating α by regression techniques, output is normally related to the capital stock or capacity rather than capital utilisation. Output is obviously less sensitive to actual capacity (which is relatively fixed) than to the utilisation of capacity. The elasticity of output with respect to labour, on the other hand, can be more easily related to a measure of labour utilisation by taking statistics of man-hours worked. It is interesting to note that a study by Brown and de Cani (1962), which took the utilisation of capital as the measure of capital input, estimated an elasticity of output with respect to capital of 0.739, which is much higher than normally estimated or employed in production-function studies. In future production-function studies much more attention needs to be paid to capacity utilisation, and also to possible discrepancies between factor prices and marginal products, before making estimates of elasticities on the basis of factor shares.

In general, the growth of the labour force has contributed as much to growth in developed countries as capital accumulation and probably more in the developing countries if embodied technical progress is ignored. Labour-force growth is neutral, of course, on the growth of income per head except to the extent that there is a relation between the growth of the work-force and the growth of labour productivity. There are conflicting views on this matter and these are discussed later in Chapter 6 in considering the so-called 'population problem'. The importance of labour is considerably enhanced when the growth of education is taken into account. In the United States over the period 1929–58 Denison (1962) has estimated that increases in education raised the quality of the labour force by the equivalent of a 0.93 per cent per annum increase in the quantity of labour. Weighting by labour's share of the national income gives a contribution of education to measured growth of 0.68 percentage points, or 23 per cent. The corresponding contribution of education to the rise in output per person employed is 42 per cent.

Production-Function Studies of Developing Countries

In recent years several production-function studies of the sources of growth in developing countries have been attempted, notably by Maddison (1970), Bruton (1967), Robinson (1971), Hagen and Hawrylyshyn (1969), Correa (1970), Gaathon (1961), Lampman (1967) (the last three studies, and others, surveyed by Nadiri (1972)), Shaaeldin (1989) and the World Bank (1991). Let us consider these studies and bring out their major conclusions, especially any important contrasts with the conclusions from studies of developed countries.

Maddison studies 22 developing countries over the period 1950–65. His approach is conventional except for the adjustment of employment growth for such factors as the migration of labour from agriculture to industry and improvements in health and education to obtain a measure of the growth of the 'effective' labour force. Allowing for these improvements, Maddison estimates an average growth of the effective labour supply for all countries of 3.9 per cent per annum, compared with actual employment growth of 2.1 per cent per annum. Labour migration is estimated to have raised the growth rate of the 'effective' labour supply by the equivalent of a 1.1 per cent increase in employment. Likewise better health and education are estimated to have raised the growth rate of the 'effective' labour supply by 0.7 per cent. The

Table 2.1 ***The Contribution of Factor Inputs and Increased Efficiency to Economic Growth, 1950–65 (measured in percentage points)***

		The contribution of		
	Growth rate (per cent)	*Human resources*	*Non-residential capital*	*Growth due to changes in efficiency*
Argentina	3.20	1.05	2.80	–0.65
Brazil	5.20	2.35	3.05	–0.20
Ceylon	3.60	1.60	2.00	–0.20
Chile	4.00	1.05	2.45	0.50
Colombia	4.70	1.80	2.90	–0.10
Egypt	4.35	1.55	2.80	1.15
Ghana	4.20	1.50	3.00	–0.30
Greece	6.40	1.30	2.85	2.25
India	3.50	2.35	2.35	–1.20
Israel	10.70	3.20	5.60	1.90
Malaya	3.50	2.05	1.80	–0.35
Mexico	6.10	2.45	3.20	0.45
Pakistan	3.70	1.70	1.85	0.15
Peru	5.60	1.20	3.40	1.00
Philippines	5.00	2.40	2.55	0.05
South Korea	6.20	2.90	2.20	1.10
Spain	7.50	1.20	3.80	2.50
Taiwan	8.50	1.70	3.50	3.30
Thailand	6.30	2.70	7.40	0.20
Turkey	5.20	1.75	2.50	0.95
Venezuela	6.70	3.10	4.65	–1.05
Yugoslavia	7.10	1.70	4.85	0.55
Average	5.55	1.94	3.06	0.55

Source: Maddison, *Economic Progress and Policy in Developing Countries*, table 11.11, p. 53.

average growth rate of the capital stock for the countries is estimated as 6.1 per cent per annum. Applying weights of 0.5 to both the growth of capital in each country and the growth of labour makes the rate of growth of capital the most important source of growth in most countries. Maddison concludes in fact that the acceleration of investment has been the most important engine of growth in the post-war developing world. Over all, the growth of the 'effective' labour force is estimated to have contributed about 35 per cent to average measured growth, and capital about 55 per cent, leaving a residual contribution of 10 per cent attributable to increased efficiency in resource allocation. The weights applied to labour and capital of 0.5 to obtain the above results may seem arbitrary but they have some support from Robinson's later cross-section study of the sources of growth in developing countries which suggests that at least the elasticity of output with respect to labour is of the order of 0.5. This weight is probably lower than labour's share of income in the average developing country. The contribution of factor inputs and increased efficiency to measured growth in each of the individual countries is shown in **Table 2.1**.

Maddison also makes the novel distinction in his analysis between growth that has been induced by policy changes and growth that would have occurred spontaneously. It appears, according to Maddison's calculations, that, on average, policy-induced growth in the form of investment and improved health and education facilities accounted for 40 per cent of measured growth. Other policy changes, however, apparently reduced growth in some countries by impairing efficiency. The negative growth due to changes in 'efficiency' shown for some countries in column 4 of **Table 2.1** is attributed by Maddison to such factors as import restrictions, misguided subsidisation and excessive inflation.

Nadiri (1972) has brought together and surveyed a number of other production-function studies for developing countries: in some cases the same countries as those taken by Maddison. For most countries the same division has been made between the contribution of factor inputs to measured growth, after allowance for improvements in the health, nutrition and education of the labour force, and the contribution of total factor productivity growth (i.e. improvements in efficiency). The only major difference between the studies surveyed by Nadiri and Maddison's study is that in the studies covered by Nadiri the contribution of resource shifts from agriculture to industry is separately identified, having been subtracted from the contribution of total productivity growth, as opposed to being included in the contribution of labour-force growth to measured growth as in Maddison's study. The detailed results of the studies surveyed by Nadiri are shown in **Table 2.2.** The major conclusions are as follows: except for

Table 2.2 ***The Contribution of Factor Inputs, Improvements in the Quality of Labour and Resource Shifts to Economic Growth in a Selection of Developing Countries***

Country	*Period*	*Rate of growth of income (per cent) (1)*	*Contribution of total labour input (2)*	*Contribution of labour input disaggregated into the effects of (3)*			*Contribution of total capital input (4)*	*Contribution of total factor productivity growth (5)*	*Contribution of resource shifts to total productivity growth (6)*
				Employment growth	*Health and nutrition*	*Education*			
Argentina	1950–62	3.19	1.58	0.93	0.12	0.53	1.43	0.18	0.18
Brazil	1950–62	5.49	2.44	1.83	0.43	0.18	1.66	1.39	0.39
Chile	1950–62	4.20	1.05	0.65	0.20	0.20	0.32	2.83	0.11
Colombia	1950–62	4.79	2.35	1.66	0.49	0.20	1.04	1.40	0.33
Ecuador	1950–62	4.72	1.47	0.92	0.32	0.23	1.07	2.18	–0.35
Honduras	1950–62	4.52	2.17	1.06	0.82	0.29	0.95	1.40	1.38
Mexico	1950–62	5.97	2.41	1.43	0.93	0.05	2.82	0.74	0.44
Peru	1950–62	5.63	1.40	0.67	0.57	0.16	1.40	2.83	0.36
Venezuela	1950–62	7.74	2.59	2.19	0.21	0.19	2.04	3.11	0.56
Greece	1951–61	5.29	2.80				1.63	0.86	0.60
India	1950–60	4.47	1.86				1.55	1.06	
Israel	1950–65	11.01	3.50				4.11	3.40	
Japan	1952–67	8.97	2.45				4.49	2.03	0.91
Philippines	1947–65	5.75	2.24				1.01	2.50	

Notes: The rate of growth of income in column 1 is the sum of columns 2, 4 and 5. All 'contributions' are measured in percentage points.
Source: Compiled from Nadiri, 'International Studies of Factor Inputs and Total Productivity: A Brief Survey', *Review of Income and Wealth*, June 1972.

Country sources: Latin American countries: Correa, 'Sources of Economic Growth in Latin America'.
Greece: E. Voloudakis, 'Major Sources of the Postwar Growth of the Greek Economy', mimeo (Athens, 1970).
India: G. Psacharopoulos, *The Anatomy of a Rate of Growth: The Case of Hawaii 1950–60*, Economic Research Centre, University of Hawaii (March 1969).
Israel: A Gaathon, *Economic Productivity in Israel* (New York: Praeger, 1971).
Japan: W. Chung, 'A Study of Economic Growth in Postwar Japan for the Period 1952–67: An Application of Total Productivity Analysis, mimeo (Denison University, 1970).
Philippines: R. Lampman, 'The Sources of Post-War Growth in the Philippines'.

the fast-growing countries of Japan, Israel and Mexico, the contribution to measured growth of total labour-input growth is shown to be greater than the contribution of capital-input growth, in contrast to the results of Maddison's study. This is mainly due to the fact that in the studies surveyed by Nadiri capital is given a smaller weight than labour, reflecting capital's lower share of national income. This only serves to emphasise the point that if the contribution of factor inputs to growth is to be assessed separately it is of prime importance that the estimates of the weights should be reliable indicators of the elasticity of output with respect to the factor inputs. Bearing in mind the point made earlier that labour's share probably exaggerates the elasticity of output with respect to labour, and that capital's share underestimates the responsiveness of output to capital accumulation, the equal weights used by Maddison are probably to be preferred. However, the studies surveyed by Nadiri support Maddison's finding that capital accumulation is a much more important source of growth in developing countries than it appears to be in developed countries. Total factor productivity growth is also shown to be of less importance in developing countries than in developed countries, which also corroborates Maddison. According to Nadiri, this is probably because a large part of investment expenditure is on infrastructure projects which do not yield productivity gains immediately, and also because the skills and quality of human resources to work with capital are still so low. A few other features of the results may also be noted. The gains to growth from improved health conditions are considerable. Their effect on growth comes via a reduction in the death rate and a reduction in the number of work days lost through illness. As long as the initial conditions are poor, there will continue to be high returns to investment in health facilities. On the other hand, it appears that the contribution of education to growth is relatively small, and also small compared to the contribution in developed countries. This may be the result of a number of factors concerned with the emphasis on education at the primary level; unemployment among the educated, and the predominant class basis of most developing countries. The contribution of resource shifts from agriculture to industry also looks smaller than might have been expected, perhaps due to the general surplus of labour in developing countries and the low capacity to absorb labour into productive employment in the industrial sector.

Bruton's study concentrates entirely on the five Latin American countries of Argentina, Brazil, Colombia, Chile and Mexico over the period 1940–64. Bruton's main interest is to explain differences in productivity growth between the countries. His major conclusion is that the main cause of differences in productivity growth has been the ability to exploit unused resources. Total productivity growth (the residual) averages 1.4 per cent per annum for the five countries, which represents a contribution to measured growth of approximately 25 per cent. This is lower than the average contribution of total productivity growth to measured growth in advanced countries. Maddison's study and the studies surveyed by Nadiri are further corroborated by Bruton's finding that total productivity growth is of less importance as an explanation of growth in developing countries than in developed countries. The major source of growth in developing countries is the growth of factor inputs themselves.

Robinson's study is a cross-section study based on data from 39 countries averaged over the period 1958–66. Robinson distinguishes four major sources of growth and the inevitable residual: the contribution of labour; the contribution of capital; the effect of resource transfers from agriculture; and the effect of foreign borrowing. The parameters from the cross-section equation allow estimation of the average contribution of these factors to measured growth across countries. From the equations which exclude foreign borrowing, the contribution of labour to measured growth is estimated as 20 per cent, the contribution of capital 52 per cent, and the contribution of resource shifts 16 per cent, leaving a residual accounting for 12 per cent of measured growth. From the equations including foreign borrowing, labour's contribution falls to 19 per cent and capital's to 32 per cent. The contribution of resource shifts rises slightly to 18 per cent and the contribution of

Table 2.3 ***The Contribution of Factor Inputs and Total Productivity Growth to Industrial Growth in Kenya, Tanzania, Zambia and Zimbabwe***

	Growth of output (per cent p.a.)	*Contribution of labour*	*Contribution of capital*	*Total productivity growth*
Kenya 1964–83	7.99	1.99	6.89	−0.89
Tanzania 1966–80	8.06	3.16	5.41	−0.51
Zambia 1965–80	4.98	1.20	9.38	−6.60
Zimbabwe 1964–81	5.28	1.88	3.39	+0.03

Table 2.4 ***The Contribution of Factor Inputs and Total Productivity Growth to Economic Growth in 68 Developing Countries 1960–87***

	GDP growth (per cent p.a.)	*Contribution of labour*	*Contribution of capital*	*Total factor productivity*
Africa	3.3	1.0	2.3	0.0
East Asia	6.8	1.1	3.8	1.9
Europe, Middle East and North Africa	5.0	0.7	2.9	1.4
Latin America	3.6	1.2	2.4	0.0
South Asia	4.4	0.9	2.9	0.6
68 Economies	4.2	1.0	2.6	0.6

Source: *World Development Report* 1991.

foreign borrowing is estimated at 14 per cent, leaving a residual contribution of 17 per cent. These results, in their estimates of the relative contribution of the factors of production and total productivity growth, are very similar to Maddison's. The results of Hagen and Hawrylyshyn are similar to Robinson's and, in addition, show some positive and lagged response to the growth of education.

The recent interesting case study of Shaaeldin, which fits equation (2.6) to four African countries, shows that over the period of the 1960s and 1970s and into the 1980s, total factor productivity growth was negative in three of the countries. The results are given in **Table 2.3** and confirm again the overwhelming importance of the contribution of capital formation to the growth process.

Finally, we present in **Table 2.4** the latest World Bank results for the period 1960–87 showing the contribution of factor inputs and total productivity to the growth of output in various continents. Once more, the overall conclusion is reached that the major source of growth is not productivity growth, but the growth of inputs themselves.

It is satisfying that the conclusions from a wide number of studies using different techniques and dubious data should all point in roughly the same direction. First, the major source of growth in developing countries is increases in factor inputs, aided by improvements in the quality of labour through health improvement and education. Second, the growth of 'total' productivity is relatively slow compared to developed countries, which may be partly a reflection of the different stage of development reached. Third, resource transfers from agriculture to industry are quite important as a source of growth but not so important as one might have expected. They will become more important as the ability of the industrial sector to absorb surplus labour increases. Robinson also finds foreign borrowing a separate identifiable source of growth suggesting that foreign exchange can be considered as a scarce factor limiting growth (see Chapter 14).

Before ending it should be said again that these aggregate models which have produced the results above are rough tools. They do, however, give an important idea of the forces at work and a rough idea of the likely quantitative significance of different factors. If one overriding conclusion emerges it is probably that developing countries ignore capital accumulation at their peril if they are to increase their rate of growth significantly.

Questions for Discussion and Review

1. What is a production function?
2. What are the special properties of the Cobb–Douglas production function?
3. What is the difference between exogenous and endogenous technical progress?
4. Why may the income shares of factors of production in developing countries give a misleading indication of the elasticity of output with respect to increases in the factors?
5. What factors does the growth of 'total factor productivity' depend on?
6. Why is the contribution of capital to growth likely to be more important in poor countries than in rich countries?
7. How can the production function be modified to measure the effects of changes in the quality of factors of production on output growth?
8. What methods can be employed to estimate the effect of resource shifts on output growth?
9. What have been the major findings of production function studies of the sources of growth in developing countries?
10. Why do factors of production and technical progress grow at different rates between countries?

Part II
Factors in the Development Process

■ *Chapter 3* ■

Land, Labour and Agriculture

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In the production-function approach to the analysis of the sources of growth, land as a separate factor of production tends to be assumed away or subsumed into capital. There are two main reasons for this. The first is the traditional classical notion of land as a fixed factor of production, which in the long run is undoubtedly true. The second is the practical fact that land without the application of capital is of little use, justifying the treatment of land and capital as one factor.

This is not to deny, however, the importance of land and natural resource endowments as factors in the growth process. The quality of land can markedly affect the level of agricultural productivity in the early stages of economic development, and the importance of agricultural development, in turn, can be clearly seen within the production-function framework. Rising agricultural productivity permits the release of labour from agriculture to industry, which in turn leads to increasing returns, rising income per head and greater capital accumulation. Given the dominance of the agricultural sector in the economic structure of developing countries, such factors as the physical attributes of land (topography, fertility, etc.), the land-tenure system, the ratio of labour to land and the extent of natural resource endowments are likely to exert a major influence on the speed of development as determinants of the pace of agricultural advance and the pace of industrialisation based on a healthy agricultural sector or the exploitation of indigenous resources. Geographical factors, including the nature of the land, and God-given factors such as weather and terrain, must be included in any list of reasons drawn up in answer to such questions as: why have some countries developed earlier than others, or why have some countries remained in a traditional or transitional state longer than others? This is the concept of geographic determinism, which can be advanced as a hypothesis of underdevelopment in its own right.

The Role of Agriculture in Development[1]

In this section we shall consider land in relation to agriculture, and discuss in a general way the role of the agricultural sector in the development process. In the course of the discussion we shall elaborate on the emergence of an economy from its traditional subsistence state into Rostow's transitional stage in which the seeds are sown for 'take-off' into self-sustaining growth. The approach to be adopted has a common-sense, pragmatic appeal since land primarily affects the productivity of agriculture, and second, the development of agriculture, owing to its initial importance in a country's economic structure, must play a crucial role in establishing the framework for industrialisation. The agricultural sector, for instance, must provide, in large measure, the factor supplies for industry; it must provide food for an urban industrial population, and it must contribute to the market for industrial goods if the demand for goods is to be sufficient to justify their production domestically. For the agricultural sector to release labour, to provide savings, to supply food and to contribute to the market for industrial goods, it must generate a steadily rising surplus of production in excess of subsistence needs. Since land is relatively fixed in supply, this requires rising agricultural productivity. The 'grass-roots' school of economic development, which came into fashion as a reaction against the emphasis on industrialisation at any cost, lays stress on policies to raise the level of productivity in agriculture as the most crucial development priority and an indispensable element of a long-run development strategy. Overall, agricultural productivity in developing countries is less than one-tenth of the level in developed countries, and in many countries output per head is barely enough to meet subsistence needs. Some progress has been made in recent years with particular crops in particular countries, but the performance of the agricultural sector is still disappointing. In the 1950s and 1960s food production per head hardly rose. In the 1970s and 1980s there was some improvement, but the availability of food still gives cause for concern, and the lack of a marketable surplus holds back development on a wide front.

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[1] For a good, rigorous, theoretical treatment of the role of agriculture in economic development see Ghatak and Ingersent (1984).

The quickest and cheapest way to raise productivity will depend on the reasons for low productivity. The reasons will vary from country to country, but it must be remembered that everywhere peasant subsistence farming is a traditional way of life and attempts to raise productivity will alter the way of life. Schultz (1980) remarks perceptively:

> Most of the people in the world are poor, so if we knew the economics of being poor we would know much of the economics that really matters. Most of the world's poor people earn their living from agriculture so if we knew the economics of agriculture we would know much of the economics of being poor. People who are rich find it hard to understand the behaviour of poor people. Economists are no exception, for they, too, find it difficult to comprehend the preferences and scarcity constraints that determine the choices that poor people make. We all know that most of the world's people are poor, that they earn a pittance for their labour, that half and more of their meagre income is spent on food, that they reside predominantly in low income countries and that most of them are earning their livelihood in agriculture. What many economists fail to understand is that poor people are no less concerned about improving their lot and that of their children than rich people are.

So what holds productivity back? In some cases it is an inappropriate labour to land ratio combined with a lack of appropriate and complementary inputs; in other cases, it is the structure and organisation of agriculture, and in many cases it is a combination of both coupled with unfavourable natural factors. Low productivity may be associated, for example, with a high population density and a high ratio of labour to land. In this case, productivity might be increased substantially with small applications of capital in the form of drainage schemes, fertilisers, etc. On the other hand, low productivity may be associated with the opposite situation of a high ratio of land to labour, in which case the solution to low productivity is likely to involve much larger doses of capital for labour to work with. Most countries in Asia have high ratios of labour to land, while in Africa the reverse is true, as was the case in many of today's richest countries at an equivalent stage in their economic history, e.g. America, Canada and Australia.

Differences in the land to labour ratio throughout the developing countries, however, can only explain a fraction of differences in productivity and in income per head. There must be more fundamental factors at work concerned with geography; the organisation of agriculture; the incentives to produce and the supply of inputs. As far as natural, geographical factors are concerned, climate and terrain determine to a large degree what goods a country can produce, the amount of cultivatable land available per inhabitant and the land's fertility. To some extent the application of capital to land can compensate for unfavourable natural forces, but there are obvious limits. Mountains cannot easily be flattened or deserts readily watered. Having said this, however, differences in natural conditions and in the productivity of the soil can be no more than another partial explanation of poverty and low productivity. Poor people are to be found along the highly productive alluvial banks of the Nile, as well as on the barren plateaus of Asia and South America. The organisation of agriculture and the structure of incentives and opportunities for improvement would seem to be of paramount importance.

The Organisation of Agriculture and Land Reform

The system by which land is held and farmed may be an impediment to increased productivity quite independent of environmental conditions. The structure of peasant agriculture differs between countries largely for historical reasons. In many parts of Latin America, for example, agriculture is based on a combination of large estates (*latifundios*) owned by a wealthy few and small farms (*minifundios*) which are often so small that they cannot support a single family. When land is held and worked in the form of large estates, it is frequently underutilised and farmed inefficiently by peasants who may have no security of tenure and who may have to relinquish to the landowner a large fraction of their output. In these circumstances, there is little incentive to efficiency and improved productivity. **Land reform**, involving the subdivision of estates, and security of tenure for the tenants, might contribute both to an increased intensity of land use and to increased efficiency and initiative on the part of the tenant farmer, particularly where he is allowed to reap fully the rewards of his own labour. The scope for land reform remains enormous in Latin America. Still 1 per cent of the largest landowners own 70 per cent of the land, while 10 per cent of the largest farms occupy 80 per cent of the land. Only Cuba, Mexico and Bolivia have undertaken extensive land reform among the countries of Latin America. Elsewhere, there have been major land reforms in Japan, Egypt, Israel, South Korea and China. There is impressive evidence that where a change in the tenure system has permitted the producers themselves to reap the rewards of new techniques, peasant farmers have been ready to break with custom and tradition. The task of persuading producers to adopt more modern methods of production and to purchase improved seed and fertiliser has been much less difficult. While *latifundios* are too big, the *minifundios* are often too small to be productive, and change is required here too towards family farms of intermediate size with security of tenure, sufficient to support a family and with the potential for a surplus.

In Asia the organisation of peasant agriculture is also an important determinant of productivity. Because of the high population density, the major problem is too many small farms operated by share-croppers and tenant farmers with the land owned by absentee landlords. As families multiply and debts rise, land is continually sold and subdivided, leading to a very inefficient structure.

Land reform may be a necessary condition for increased productivity, but it is clearly not a sufficient condition. Land reform is not always successful, and many countries have experienced increased agricultural productivity without alteration of the land-tenure system. Since conditions vary so much from country to country, it is difficult to generalise, but in theory, at least, agrarian reform may be a precondition of increased production.[1]

The Supply Response of Agriculture

What may also be required is a rise in the price of agricultural products relative to industrial products to induce extra supply. Traditionally, attempts have been made to 'tax' the agricultural sector by keeping prices low in order to maintain the terms of trade in favour of the industrial sector. Such a policy was also justified by the widespread belief that peasant producers in traditional societies would not respond to price incentives. The assumption has proved to be unjustified. Depressing the terms of trade has depressed agricultural output and caused problems for the feeding of a growing industrial population. Many countries have had to turn to introducing a positive price policy to act as a stimulus to agricultural output in general and to alter the composition of agricultural output as circumstances warrant. There is in fact considerable evidence that producers, especially those in close proximity to large markets with good transport facilities, respond positively to price changes, as economic theory would predict. Schultz (1964) has argued that 'the doctrine that farmers in poor countries either are indifferent or respond perversely to changes in prices . . . is patently false and harmful. Price policies based on it always impair the efficiency of agriculture.' And Behrman (1968) concludes his study of four commodities in Thailand by saying that the evidence 'strongly supports the hypothesis that farmers in economically underdeveloped countries respond significantly and substantially to economic incentives. . . . The burden of proof thus now lies with those who maintain that the supply behaviour of farmers in underdeveloped agriculture cannot be understood predominantly within the framework of traditional economic analysis.'

In discussing the supply response of agricultural output to price, however, a distinction needs to be made between three types of response: first, a change in the composition of agricultural output to a change in the *relative* price of individual agricultural commodities; second, an increase in total agricultural output to an improvement in the relative price of agricultural commodities compared with industrial goods; and third, an increase in the marketed surplus in response to an increase in the price of agricultural commodities. Most of the studies done on the supply response in peasant agriculture in developing countries relate to how producers respond to changes in the relative price of different agricultural commodities. But, of course, it would be quite possible for the supply of any individual commodity to be quite elastic with respect to price, yet the total supply of agricultural output and the marketed surplus to be quite inelastic, or even to fall, in response to a rise in price. Having said this, however, there are reasons for believing that the other two elasticities are likely to be positive if the supply of individual commodities is positive, especially where crops are not just grown for subsistence purposes. For example, for any crop grown commercially the elasticity of marketed supply will be virtually equal to the output elasticity, and unless inputs were withdrawn from the production of other commodities the elasticity of total agricultural supply would also be positive. Only in cases where peasants were content with a fixed money income, or all increased production of a commodity was consumed within the subsistence sector, would the elasticity of marketed supply be negative or zero at the same time as the price elasticity of supply was positive. These conditions are not likely to prevail.

Empirical research on the supply response of agriculture can be divided into four main categories: (i) cross-country studies which look at output differences in relation to price differences across countries; (ii) time series studies which examine output movements in relation to price movements within countries over time; (iii) cross-section studies which look at output differences in relation to price differences across farms within a country; and (iv) intersectoral general equilibrium models which examine how the output of agriculture varies in response to changes in the prices of agricultural goods relative to the price of other goods in the economy.

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[1] For an excellent survey of the issues, see Dorner (1972). For some more detailed case studies, see Lehmann (1974).

The evidence shows that aggregate supply elasticities of agricultural output range from 0.3 to 0.9 (Chhibber (1988)). The long-run elasticity is obviously higher than the short-run elasticity, and the elasticity tends to be higher in the more advanced and land-abundant developing countries. The supply response of farmers to price changes depends crucially on the ability of farmers to respond to price signals which depends, in turn, on transport and infrastructure, and access to agricultural inputs. In poorer countries with inadequate infrastructure, the supply elasticity is low (0.2–0.5). In fact, the supply elasticity of agriculture with respect to non-price factors (e.g. the provision of public goods and services) is much higher than with respect to price, especially in poorer developing countries with inadequate infrastructure and marketing facilities.

Surveys of the supply elasticity of crops in different countries have been done by Behrman (1968), Krishna (1967), and Askari and Cummings (1976). That by Krishna is more condensed and is reported here in **Table 3.1.** In all cases the measure of supply response is acreage under cultivation rather than output yield because of the various seasonal and other factors that can influence yield from year to year.

The International Monetary Fund (IMF) and World Bank are naturally concerned with the performance of the agricultural sector in countries to which they lend under various adjustment programmes (see Chapters 14 and 16). Three interrelated issues are typically addressed: the terms of trade between agriculture and the rest of the economy; the efficiency of the agricultural sector; and the supply response of agriculture to price changes.

With regard to the agricultural terms of trade, the IMF normally insist that the prices paid by State Marketing Boards to producers be increased. Traditionally, governments have 'taxed' the agricultural sector through agricultural Marketing Boards driving a large wedge between the prices paid to producers and the market prices of the commodities concerned. One implication, therefore, of raising producer prices is that government revenue may fall. This then has implications for government expenditure if there is a budget constraint. Only if the elasticity of the supply of output with respect to producer prices is greater than unity will government revenue not fall, but as we saw above, the supply elasticity is typically less than unity.

Table 3.1 ***Elasticities of Supply of Farm Products (Acreage) in Developing Countries***

Area and commodity	*Time period*	*Elasticities*	
		Short-run	*Long-run*
Punjab, rice	1914–45	0.31	0.59
Philippines, rice	1954–64	0.13–0.22	0.15–0.62
Indonesia, rice	1951–62	0.30	
Punjab, wheat	1914–43	0.08	0.14
India, cotton	1922–3	0.59	1.08
India, cotton	1948–61	0.64	1.33
India, jute	1911–38	0.46	0.73
Punjab, sugar cane	1915–43	0.34	0.60
Egypt, cotton	1913–37	0.40	

Source: Krishna, 'Agricultural Price Policy and Economic Development' (1967); based on summary made by Krishna of research done by him and others.

To achieve efficiency within agriculture, the IMF concentrates on such factors as: improving storage and transport facilities; increasing the availability of agricultural inputs and improving extension services; and enhancing the efficiency of public enterprises in agriculture by insisting on the economic pricing of output and inputs, and by privatising marketing and extension services.

We saw earlier that the supply response of farmers to price changes depends a great deal on the ability to respond which depends on infrastructure, transport, access to inputs and so on. Governments may be in a dilemma here because raising producer prices and reducing their own revenue may impair their ability to spend on infrastructure etc. Given that the elasticity of supply with respect to non-price factors is higher than with respect to price, it would seem unwise to cut public expenditure as far as it affects the agricultural sector.

Transforming Traditional Agriculture

The task of transforming traditional agriculture is not simply a question of land reform or price policy, however. The transformation of traditional agriculture is also dependent on new inputs. The policy issue is to determine the form that the new inputs should take if agriculture is to attract an adequate share of investment resources. The task is not exclusively a question of the supply of capital.

Schultz (1964) has argued that the low productivity of farm labour is due more to an absence of specific factor inputs, such as research and education, than to a shortage of reproducible capital as such. He contends that the most practical and economical approach to achieving sizeable increases in agricultural productivity lies in enhancing the efficiency of the existing agricultural economy through improvements in the quality of inputs, and by the application of advances in knowledge and modern technology on a broad front. Additional quantities of *existing* inputs will achieve nothing because of very low rates of return. Indeed, contrary to the conventional view that a stagnant agricultural sector is the result of the reluctance of peasant producers to respond to incentives, Schultz argues that it is traditional agriculture which is the *cause* of the seeming antipathy to work and investment because of low returns at the margin to existing inputs. The way to transform traditional agriculture into a relatively cheap source of growth is by investment to produce a supply of new agricultural inputs that will be profitable for farmers to adopt. Schultz suggests that what has been lacking in the past is not an unwillingness on the part of the agricultural sector to accept new ideas but public expenditure and the organisation of particular public activities to serve the agricultural sector. Agricultural research, and investment in man to improve human capabilities in agriculture, have been too readily neglected. He points to the rapid rise of agricultural productivity in Japan and Taiwan in the late nineteenth and early twentieth centuries which was due to forms of 'technical progress' that are taken for granted in the developed countries; for example, the application of fertilisers and the selection and cultivation of high-yield crops. With the so-called 'green revolution', the scope for yield increases has become widespread in developing countries, and rates of return on investment in new technologies and varieties of seed can be very high. Mexican 'dwarf' wheat is a prime example of the impact that technology can have on the productivity of agriculture. What matters most, then, are the incentives and associated opportunities that farm people have to augment production by means of investments that include the contribution of agricultural research and the improvement of human skills. 'An integral part of the modernisation of the economies of high and low income countries is the decline in the economic importance of farmland and a rise in that of human capital – skills and knowledge' (Schultz (1980); see also Griffin (1979)).

It must also be recognised that subsistence agriculture is an uncertain activity and therefore risky, particularly when survival is at stake, and this is another factor that breeds conservatism and makes change difficult even in the face of opportunities.[1] Poor people prefer to be safe than sorry; they will tend to prefer an inferior outcome that is relatively certain to the prospect of a higher average return with a greater degree of risk attached. They are **risk averse**. This is clearly not irrational behaviour for poor people living on the margin of subsistence, even if the greater risk is imagined rather than real. To overcome inertia on this score, an integral element of agrarian reform must be policies designed to minimise risk and uncertainty through the provision of various types of insurance.

The Growth of the Money Economy

The question of the willingness to change customs and traditions leads naturally to a consideration of how peasant subsistence economies, producing goods for consumption only, typically transform themselves into money economies with an export and industrial sector. From historical experience two factors would appear to be crucial for the expansion of the agricultural sector and the eventual production of goods for exchange at home and abroad. One is the expansion of communications to create outlets and markets for surplus production (and to encourage the production of the surplus itself). The other is the emergence of a class of middlemen or export–import merchants acting as agents between world markets and the domestic agricultural sector. If these conditions prevail, purely subsistence farming can develop first into mixed agriculture, where part of the crop is retained for subsistence and part is sold in the market, and finally into modern agriculture with production entirely for the market, very often based on one crop. In the transition from subsistence agriculture, cash crops can utilise slack labour and land when the subsistence crops are finished; but the transition into mixed farming is only possible if the farmer has the inputs to raise productivity and credit to purchase the inputs, as well as the marketing facilities. Modern agriculture, run on strictly commercial lines for profit and based on one crop, must rely on exports since the size of the domestic market will generally be too small. The system of modern commercialised agriculture, on which so many less developed countries are now dependent for their export earnings, is often termed **Agribusiness**. This is a catch-all phrase referring not only to the production of the commodity in question, but also to the backward and forward linkages associated with the production process; the provision of finance, machinery, fertilisers, seed, etc. at the input end and the processing, manufacturing and marketing of the product at the output end. Today, the multinational corporations have a powerful position and a strong hold over the production and export of major agricultural commodities produced in the developing countries. To give just a few examples: three US firms control over one-half of the global banana trade; five European companies control 90 per cent of tea sold in the West, and the two largest coffee companies control 20 per cent of the world market.

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[1] This is particularly stressed by Galbraith (1980).

Both the ability to export and the ability to market internally imply surplus production over subsistence needs, and it is the size of this surplus that will largely determine the speed with which the subsistence sector can be drawn into the money economy. Again we come to the point that unless productivity in agriculture increases, the expansion of the monetised sector will tend to decelerate as the land for cultivation dries up. When land has been exploited to the full it acts as a constraint on development unless agricultural productivity increases or non-agricultural activities can be established.

The emergence of an export sector provides a powerful stimulus to development and the extension of the money economy. Exports create the capacity to import and the very purchase of foreign products can encourage further export specialisation. A population which acquires a taste for imported goods provides the impetus to producers to export more. In the case of new goods, as well as new techniques, there is strong evidence that peasant producers respond to incentives, and are not so dissimilar to Western economic man as is sometimes claimed. Imports also provide a stimulus to industrialisation. If a market for a foreign-manufactured good becomes established it becomes easier, and less risky, with the aid of tariff protection, for a domestic manufacturer to set up in business because the market is assured. Imports can also substitute for domestic capital and raise the growth rate directly.

When farmers start to specialise in goods for export, and rely on other producers for goods which they previously produced themselves, the money economy will spread from the foreign trade sector to the rest of the domestic economy. This is nothing more than the international division of labour giving rise to the need for a means of exchange within a country as well as between countries.

The transition from a state of total dependence on the production of agricultural goods to a state of dualism, with the coexistence of a subsistence agricultural sector and a commercialised industrial sector, is a significant landmark in the development of an economy. The dual economy sets up incentives which are absent in the purely agrarian economy, and provides a new form of saving (the capitalist surplus). Profit gives the owners of industrial capital the incentive to innovate, and the possibility of acquiring assets in the industrial sector gives an incentive to agricultural producers also. Differences in agricultural productivity are frequently related to the proximity of farms to an industrial–urban complex.

The emergence of an export sector, the spread of the money economy, and the establishment of industries typically occur concurrently. What form industrialisation takes will depend, in the first instance, on the initial impetus. One stimulus to industrialisation, which we have already mentioned, is imports creating a market for goods that can be produced domestically without much difficulty. A more obvious factor leading naturally to industrialisation is the availability of resources from the land forming an indigenous industrial base. In this case industrialisation takes the form of the processing of raw materials. There are few countries which do not possess some natural resource or other, and every country will have a comparative advantage in the production of one or other raw material that can be processed. These are the agribusinesses mentioned earlier.

In many of the present developing countries, formerly under colonial rule, the initiating force behind industrialisation was the foreign exploitation of resources. Industrial activity took the form of mining operations and plantation agriculture. The establishment of foreign enclave activities undoubtedly exerted a development impact, but it is an arguable point whether development would have been more rapid had the countries been left to their own devices. Some would claim that the long-run development of the countries has been impaired because the availability of cheap labour from the subsistence sector has discouraged the installation of more modern productive machinery, and also that the foreign ownership and exploitation of a country's resources have considerably reduced its potential level of investment through the remittance of profits. The argument begs and raises many important issues concerning development strategy, which are dealt with in some detail in Part IV of the book.

Finance for Traditional Agriculture

For many years traditional agriculture has been starved of investment resources. While it accounts for approximately 30 per cent of output and 60 per cent of total employment, it attracts little more than 10 per cent of total investment resources. Private capital has no doubt been deterred by the risks involved and the low returns in traditional agriculture, as stressed by Schultz. But institutional investment has also been meagre, at least up until recently. Shonfield (1960) pointed out some years ago that of $4 billion development loans made by the World Bank between 1947 and 1959, only $124 million went into agriculture. In recent years, however, there has been some reversal of this neglect. Since the global food crisis of the early 1970s, the World Bank has accelerated its lending for agriculture and rural development, and has also reorientated its support toward raising the productivity of low income groups. Since 1973, the Bank's direct lending for agricultural development in the developing world has grown from $1.4 billion a year to over $3 billion today. This represents approximately 20 per cent of all Bank lending. Some projects have involved increasing the output of traditional crops through the more effective use of seeds, fertiliser and water. Other projects have involved changing the product mix from subsistence crops to the production of high-value crops, such as the smallholder tea project in Kenya. Irrigation is the largest single component of Bank lending to agriculture, which permits the expansion of cultivation and makes more intensive cultivation possible by permitting double cropping. Bank-financed irrigation schemes have had a major impact on rice yields and production in Asia. The World Bank has also become the most important source of financial and technical assistance for the construction of fertiliser plants in developing countries which have played an important role in increasing yields and output. The Bank gives credit for rural infrastructure projects, such as roads to reduce marketing and supply bottlenecks, and rural electrification schemes. Agricultural extension is another important aspect of the Bank's assistance to the rural sector. In India where 'contact' farmers disseminate knowledge to their neighbours of improved techniques learnt from field agents, over 10 million farm families have been helped. The rural poor now have more extensive and easier access to credit financed by the Bank. In India much of the credit has been used by small farmers to provide supplementary irrigation. Finally the Bank operates various multipurpose projects that combine a wide range of activities normally in conjunction with a regional development programme. In Mexico, some 75 000 low-income families have benefited from such a project in some thirty localities through investments in irrigation, soil conservation, electrification, schools, health care, water supplies and marketing services. Each dollar the Bank invests in rural development is supplemented by local investment, and the Bank rightly stresses that its contribution to the total flow of resources can only be effective if appropriate national policies are also pursued on pricing, taxation, land reform and so on. The major part of the Bank's programme to reach the rural poor is still in the process of implementation, and is therefore difficult to assess reliably, but indications suggest that a combination of additional resources combined with institutional reform and national government commitment to improvement in the rural sector, can have a major impact.

Apart from the World Bank, other multilateral institutions exist to help traditional agriculture, notably the United Nations' International Fund for Agricultural Development (IFAD), which seeks to integrate small farmers and landless people into the development process. The Fund states that its priority is for 'projects which will have a significant impact on improving food production in developing countries, particularly for the benefit of the poorest sections of the rural population'. Up to 1990, over one billion dollars had been dispersed.

In the absence of external institutional investment, the sources of capital for the expansion of both agriculture and industry are relatively limited in the early stages of development. In a truly subsistence economy, in the sense of an economy producing only what it needs for itself and no more, everyone is a Robinson Crusoe supplying his own capital by refraining from present consumption. With specialisation in the production of goods for export, and the producer's need for capital to expand productive capacity, mechanisms grow up spontaneously to meet the need for credit. It is a good market maxim that demand will create a supplier at a price. The suppliers are generally village money-lenders, shopkeepers, landlords and not infrequently the Church – especially in South America – charging rates of interest often in excess of 50 per cent.

The Interdependence of Agriculture and Industry

Once agriculture emerges from its stagnatory, subsistence state and starts to specialise and produce goods for export, and industry develops under the impact of growth in the agricultural sector, the two sectors of agriculture and industry become very much interdependent. The industrial sector adds to the demand for goods produced by agriculture, and absorbs surplus labour which may raise productivity in agriculture. The agricultural sector, in turn, provides a market for industrial goods out of rising real income, and makes a factor contribution to development through the release of resources if productivity rises faster than the demand for commodities. We discuss more fully this interaction later in the chapter.

The transfer of resources from agriculture to industry may be capital or labour or both. Since labour is in abundant supply in most low-income countries, there is generally no difficulty involved in releasing labour for industry except at harvest periods. Labour, in any case, will tend to migrate naturally in response to seemingly better opportunities in the industrial sector and higher real incomes. The real earnings of labour in the industrial sector may be over twice as much as the agricultural wage. If the industrial sector is to be guaranteed an adequate supply of labour, some wage differential is inevitably required to offset the higher real living costs in an urban environment, to compensate for the forfeit of non-monetary benefits of rural life, and also to compensate for greater job uncertainty in the industrial sector. Real earnings may also be higher because of genuinely higher productivity in the industrial sector where labour has more of other factors of production to work with. Most models of rural–urban migration make migration a positive function of the *expected* urban–rural wage differential, which is the difference between the urban wage, adjusted for the proportion of the total urban labour force employed (as a proxy for the probability of finding work), and the agricultural real wage expressed in terms of manufactured goods.[1] (See later for an outline of the model.)

Capital may be less 'mobile' than labour, and if there is considered to be insufficient lending from the agricultural sector on a voluntary basis it may become necessary for a government to transfer savings compulsorily from the agricultural sector by taxation. This method was resorted to in a severe manner by Japan at the time of the Meiji restoration and by Soviet Russia after the revolution. In Japan between 1880 and 1900 the land tax provided approximately 80 per cent of central government tax revenue, and in Russia forced extraction of the agricultural surplus took the form of expropriation of land and extermination of the work-force. Industrialisation in Western Europe, and particularly in England, was also financed to a large extent by surpluses generated on the land, but transference of these surpluses was on the whole voluntary through a rapidly expanding banking system. The developing countries today, despite their access to foreign sources of capital, must also rely heavily on extracting the surplus from agriculture to finance industrialisation. The difficulty is to decide on the best means of extraction without impairing the incentive to produce, or damaging the growth of productivity on which a growing agricultural surplus depends. The finance of economic development will be discussed more fully in Part V.

Economic Development with Unlimited Supplies of Labour

The process of the emergence of a money economy from a subsistence state has been formalised by Professor Lewis in his celebrated paper 'Economic Development with Unlimited Supplies of Labour'.[2] There he presents a 'classical' model of a dual economy with the purpose, as he describes it, of seeing what can be made of the classical framework in solving the problems of distribution, accumulation and growth. His ultimate aim is to emphasise the crucial role of the capitalist surplus in the development process.

The Lewis model starts, therefore, with the assumption of a dual economy with a modern exchange sector and an indigenous subsistence sector, and assumes that there are unlimited supplies of labour in the subsistence sector in the sense that the supply of labour exceeds the demand for labour at the subsistence wage; that is, the marginal product of workers in the subsistence sector is equal to or below the subsistence or institutional wage so that a reduction in the number of workers would not lower the average (subsistence) product of labour and might even raise it.

It has even been argued that the marginal product of labour may be zero or negative in an economy still at a fairly low level of development experiencing a rapid growth of population. One of the distinguishing features of agriculture is that it is an activity subject to diminishing returns owing to fixity of the supply of land. If there is rapid population growth and labour has little employment opportunity other than on the land, a stage may be reached where the land cannot give further workers a living unless existing workers reduce their own hours of work drastically. These propositions are illustrated in **Figure 3.1**. The curve drawn represents the marginal product of successive units of labour added to the land. After the employment of *OX* units of labour the marginal

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[1] E.g. Harris and Todaro (1970); Todaro (1969) and (1971).

[2] Lewis (1954, 1958). See also the symposium on the Lewis model to celebrate its 25th anniversary in the *Manchester School*, September 1979.

Figure 3.1

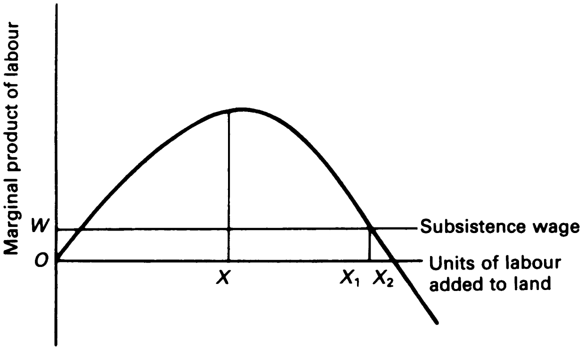
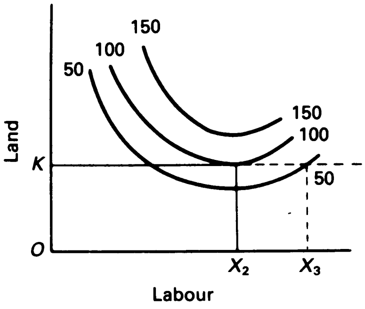


Figure 3.2

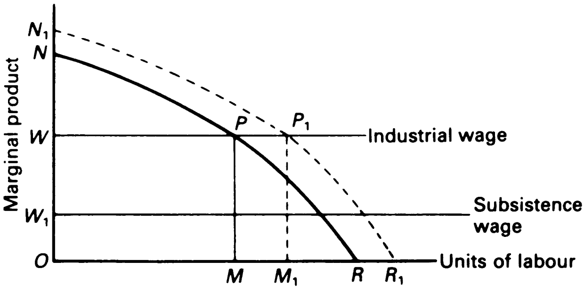


product of labour begins to fall owing to diminishing returns; after OX_1 units of labour, labour's marginal contribution to output falls below the subsistence wage; and after OX_2 units of labour, labour's contribution to output becomes negative and total product will decline with successive additions of labour beyond OX_2.

The same tendencies can also be represented using the type of production-function diagram introduced in Chapter 2, which is reproduced in **Figure 3.2**. With more than OX_2 labour employed with a fixed amount of land, *OK*, the marginal product of labour becomes negative, and further additions to the labour supply, without corresponding increases in the amount of land, will push the economy on to a lower production function, i.e. total output will fall from 100 units to, say, 50 units with OX_3 units of labour.

There are three main means of escape from the tendency towards diminishing returns and zero marginal product in agriculture: first, by pro-

Figure 3.3



ductivity increasing faster than population through the absorption of more and more of the agricultural population into industry; second, by technical progress in the agricultural sector increasing labour's marginal product; and third, by capital accumulation which can raise productivity directly and which can also be the vehicle for technical progress.

In Lewis's model, labour in excess of OX_1 in **Figure 3.1** is in completely elastic supply to the industrial sector at whatever the industrial wage. The industrial or capitalist sector is represented in **Figure 3.3**. The curve *NR* represents the marginal product of labour in the capitalist sector, *OW* is the industrial wage and, on the profit-maximising assumption, labour is employed in the capitalist sector up to the point where the marginal product is equal to the wage rate. That is, *OM* will be employed. Workers in excess of *OM* earn what they can in the subsistence sector. The industrial wage is assumed to be determined in some relation to the wage that workers can earn in the subsistence sector. The differential (WW_1) between the industrial wage and the subsistence wage will be a function of many factors, some of which were mentioned earlier, e.g. higher real living costs in the capitalist sector and greater job uncertainty. Given that the industrial wage is based on earnings in the subsistence sector, capitalists have a direct interest in holding down productivity in the subsistence sector, and Lewis comments that the record of every imperial power in Africa in modern times was one of impoverishing the subsistence economy.

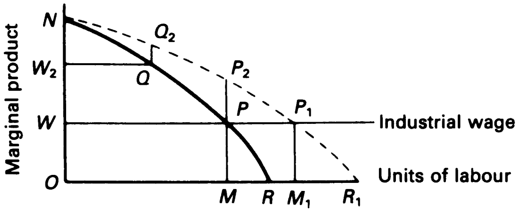
The total product of labour, *ONPM*, in **Figure**

3.3 is split between the payment to labour in the form of wages, *OWPM*, and the capitalist surplus, *WNP*. The expansion of the capitalist sector and the rate of absorption of labour from the subsistence sector depends on the use made of the capitalist surplus. If the surplus is reinvested leading to greater capital formation, this will increase the total product of labour. The marginal product curve will shift upwards to the right, say to N_1R_1, which means that if wages remain constant the capitalist sector can now afford to employ more labour and will do so by drawing on labour from the subsistence sector to the extent of MM_1 workers. The size of the capitalist surplus will increase from *WNP* to WN_1P_1 which is available for further reinvestment, and so the process goes on. This for Lewis is the essence of the development process. The stimulus to investment in the capitalist sector comes from the rate of profit which must rise over time because all the benefits of increased productivity accrue to capital if the real wage is constant.[1]

According to Lewis, the share of profits in the national income (*P*/*O*) will also rise. First, the share of profits in the capitalist sector (*P*/*C*) will increase, and second, the capitalist sector relative to the national income (*C*/*O*) will tend to expand, i.e. if $P/O = P/C \times C/O$, then *P*/*O* will rise as *P*/*C* and *C*/*O* increase.

Whether the share of profits in national income does rise with development is ultimately an empirical question. At the theoretical level, however, Professor Enke (1962) has accused Lewis of being led astray by his diagram, and questions whether the *P*/*C* ratio does necessarily rise. If the successive marginal product curves are drawn parallel to each other, the capitalist surplus area does rise more than proportionately to the wage-payment area, so that the surplus and profits as a proportion of income appear to rise. But is it legitimate to draw the curves parallel? If the capital stock is augmented through reinvestment of the surplus (say, doubles), then, *assuming constant returns to scale*, the marginal product of the *n*th labourer now becomes that of the 2*n*th labourer; that is, what was the marginal product of the first labourer will now be the marginal product of the second labourer, and what was the marginal product of the second labourer will now be the marginal product of the fourth labourer, and so on. It is not strictly correct, therefore, to draw the successive marginal product curves as parallel to each other representing different proportionate increases in product per man. Instead, each curve should be drawn from the same vertical intercept, keeping the proportionate gap between the two curves the same as in **Figure 3.4**. If the upward shift in the curve, *NR* to NR_1, is proportionately the same over the whole of its range, the capitalist surplus and the payment to labour rise at the same rate, leaving the share of profits in the capitalist sector unchanged, i.e. if $Q_2Q/W_2Q = P_2P/WP$, then $WNP/ONPM = WNP_1/ONP_1M_1$.

Figure 3.4



This technicality does not detract from the usefulness of the Lewis model. For one thing, the main function of Lewis's model is to represent a process, and to contribute to an understanding of the nature of the economic problem in backward economies. Second, Lewis is more concerned with the *size* of the capitalist sector relative to the total economy (*C*/*O*), an increase in which will also cause the share of profits in national income to rise. The evidence of this comes from Lewis himself when he says: 'If we ask why the less developed countries save so little the answer is not

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[1] The profit rate can be expressed as:

$$P/K = \frac{(O/L - w/p)}{K/L}$$

where *P* is profits, *K* is the quantity of capital, *O*/*L* is the productivity of labour, *w*/*p* is the real wage and *K*/*L* is the capital–labour ratio. The profit rate will rise if *O*/*L* rises and *w*/*p* remains the same (assuming no offsetting rise in *K*/*L*).

because they are so poor but because their capitalist sector is so small.' Accepting the strict classical assumptions that all wages are consumed and that all profits are saved, the savings ratio depends not only on the share of profits in the capitalist sector but on the size of the capitalist sector as well.

The process outlined by Lewis comes to an end when capital accumulation has caught up with population so that there is no longer surplus labour in the subsistence sector left to absorb. When all the surplus labour is absorbed, the supply of labour to the industrial sector becomes less than perfectly elastic. It is now in the interests of producers in the subsistence sector to compete for labour, since the marginal product of labour is no longer below the institutional wage. When this point is reached, the agricultural sector can be said to have become commercialised. This change in producer behaviour in the subsistence sector has also been defined as the end of the take-off stage (Ranis and Fei (1961)).

Implicit in the Lewis model is the assumption that employment growth in the capitalist sector will be proportional to the rate of capital formation. If profits are reinvested in labour-saving technology, however, this will not be so, and the rate of growth of employment in the industrial sector, and the rate of absorption from the agricultural sector, may be very low.

It is also possible that the process of absorption may end prematurely before surplus labour in the subsistence sector is fully exhausted, owing to checks to the expansion of the capitalist surplus. First, capital accumulation and labour absorption may be checked for reasons which are related to the expansion of the capitalist sector itself. For example, as the capitalist sector expands, the terms of trade may turn against it. If the demand for food expands faster than agricultural productivity, the capitalist sector will be forced to pay higher prices for food in exchange for industrial goods, reducing the size of the capitalist surplus. This will have two effects. First, if the capitalists are forced to pay higher prices for the goods they buy relative to those that they sell, this means less saving for investment. The problem does not arise if productivity in agriculture is expanding rapidly, but Lewis himself recognised that the failure of peasant agriculture to increase its productivity has probably been the chief factor holding back the expansion of the industrial sector in many developing countries. If this is so, argue Lewis's critics, the growth of non-farm employment can be said to depend on the growth of the agricultural surplus. This, in fact, is the starting point of **neoclassical models of development** (see Jorgenson (1966)), in contrast to classical models with their exclusive stress on the supply of capital. The second effect arising from the expansion of the capitalist sector if there is a shortage of food is that the real wage may have to rise in industry further squeezing the capitalist surplus. If labour is needed in agriculture to meet the demand for food, unlimited supplies of labour at a *constant real wage* may be very limited indeed. The assumption of unlimited supplies of labour is the central proposition underlying the classical approach to the theory of development, and Jorgenson (1966, p. 54) has argued that the classical approach stands or falls by this hypothesis. Historically, of course, real wages have risen in agriculture and industry, and the capitalist sector has also expanded rapidly, which lends support to a middle view between the classical and neoclassical approaches. Lewis himself recognised the importance of both capital accumulation and food supply, and it is this consideration which forms the basis of his argument for the balanced growth of the agricultural and industrial sectors.

Capital accumulation in the industrial sector may also be checked for reasons unrelated to the expansion of the capitalist sector and its demand for food. For example, real wages may be forced up directly by labour unions, or indirectly through rising real wages in the subsistence sector due to increased agricultural productivity. Lewis himself states 'anything which raises the productivity of the subsistence sector (average product per person) will raise real wages in the capitalist sector, and will therefore reduce the capitalist surplus and the rate of capital accumulation, unless it at the same time more than correspondingly moves the terms of trade against the subsistence sector'.

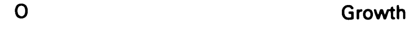
Lewis reaches this conclusion because one of the simplifying assumptions of his classical two-sector model is that the expansion of the capitalist sector is limited *only* by a shortage of capital, so that any increase in prices and purchasing power for farmers is not a stimulus to industrialisation but an obstacle to the expansion of the capitalist sector. How does this square with the idea of the agricultural sector providing a market for industrial goods, and the view of the World Bank (*World Development Report*, 1979) that 'a stagnant rural economy with low purchasing power holds back industrial growth in many developing countries'? The answer is that there does seem to be a contradiction, because the classical approach emphasises supply to the exclusion of demand, or rather takes for granted that there will always be a market clearing price for industrial goods. In fact, there will be a minimum below which the price of industrial goods cannot fall, set by the subsistence wage in industry. Johnston and Mellor (1961) recognised this worrying feature of the Lewis model many years ago when they perceptively remarked 'there is clearly a conflict between emphasis on agriculture's essential contribution to the capital requirements for overall development, and emphasis on increased farm purchasing power as a stimulus to industrialisation. Nor is there any easy reconciliation of the conflict.' The challenge of reconciliation has never been taken up in a simple way, but there is a resolution of the conflict if the **complementarity** between the two sectors is recognised from the outset, and it is remembered that there must be an equilibrium terms of trade that balances supply and demand in both sectors. The basis of the model comes from Kaldor (1979).

A Model of the Complementarity Between Agriculture and Industry.[1]

We have seen that agriculture provides the potential for capital accumulation in industry by providing a marketable surplus. The greater the surplus, the cheaper industry can obtain food and the more saving and capital accumulation can be undertaken. This is the supply side. But industry also needs a market for its industrial goods, which in the early stages of development must largely come from agriculture. This is the demand side, and the higher the price of agricultural goods the greater agricultural purchasing power will be. Given this conflict between low food prices being good for industrial supply and high food prices being good for industrial demand, what is required is a simple model which brings together agriculture and industry in an equilibrium framework, where the terms of trade between agriculture and industry provides the equilibrating mechanism ensuring that supply and demand grow at the same rate in each sector.

Let us first model growth in the agricultural sector in relation to the terms of trade; then growth in the industrial sector, and then bring the two sectors together. Agriculture's growth rate will be a function of how much it invests relative to output and of the productivity of investment. How much investment goods it obtains from industry in exchange for food that it 'saves' depends on the price of industrial goods relative to food, i.e. on the terms of trade between industry and agriculture. The higher the price of investment goods, the less investment possible for a given amount of food and the lower the growth of supply capacity. The inverse relation between the industrial terms of trade (the price of industrial goods relative to the price of food) and the agricultural growth rate (g_A) is shown in **Figure 3.5**.

Figure 3.5



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[1] A formal algebraic model, with various extensions, may be found in Thirlwall (1986).

Figure 3.6

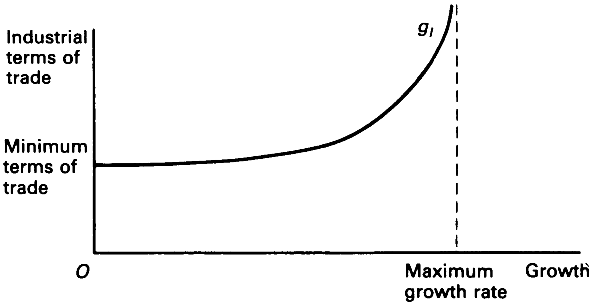
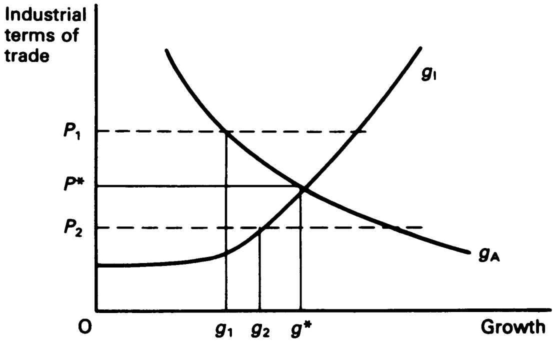


Figure 3.7



Industry's growth rate will also be a function of its investment ratio and the productivity of investment. But there is a certain minimum terms of trade below which industry would not be able to invest anything because all output would be required to pay workers' wage goods (food). If all wages are consumed the cost of food input per unit of output in industry will depend on the real wage rate in industry divided by the productivity of labour, i.e. $w/(O/L) = W/O$, where w is the real wage and W is the wage bill. Industrial prices must cover W/O, and this sets the lower limit to industrial prices relative to food prices. At the other extreme, industrial growth cannot exceed a certain maximum where the price of industrial goods is so high relative to the price of food that agriculture buys no industrial goods and all industrial goods are retained for reinvestment in industry. The investment ratio approaches, in effect, 100 per cent, and the upper limit to growth is given by the productivity of investment. The positive relation between the industrial terms of trade and the industrial growth rate (g_I) is shown in **Figure 3.6**.

If we now assume for simplicity (although without loss of generality) that the income elasticity of demand for agricultural and industrial goods is unity, then at a given terms of trade, the rate of growth of agricultural output represents the rate of growth of demand for industrial goods, and the rate of growth of industrial output represents the rate of growth of demand for agricultural output, and where g_A and g_I cross there will be balanced growth of agriculture and industry (g^*) at an equilibrium terms of trade (p^*), as shown in **Figure 3.7.**[1]

In this model of the complementarity between agriculture and industry, we can see the implications of what happens if the terms of trade are not in equilibrium, and the checks to the expansion of industry that Lewis mentions.

If the terms of trade are not in equilibrium – if the price of food is 'too low' or 'too high' in relation to industrial goods – then industrial growth is either demand constrained or supply constrained. For example, if in **Figure 3.7** the terms of trade were at P_1, because the price of food was 'too low', industrial growth would be demand constrained to g_1 by a lack of agricultural purchasing power over industrial goods. Industry could accumulate capital, but it could not sell its goods. Alternatively, if the terms of trade were below equilibrium at P_2, industrial growth would be supply constrained to g_2 because the price of food was 'too high' impairing capital accumulation in industry. Agriculture could buy, but industry could not supply. Growth is maximised at P^*.

We can now examine what happens if there are shifts in the curves. Clearly shifts in the curves will cause both the growth rates and the equilibrium terms of trade to vary. An improvement in agricultural productivity which shifts g_A outwards will mean both higher industrial growth and an improvement in the industrial terms of trade. The importance of agricultural productivity improvement could not be better illustrated. An improvement in industrial productivity will shift g_I outwards which will also mean higher industrial growth but at the expense of a worse terms of trade for industry. If there is a tendency for real wages in industry to rise commensurately with productivity increases, however, the g_I curve will remain stable and the terms of trade will never move against industry in favour of agriculture unless agricultural productivity falls and the g_A curve shifts inwards.

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[1] If the income elasticity of demand for industrial goods is greater than unity, and for agricultural goods less than unity, then the equilibrium growth rate for industry will exceed that for agriculture.

The checks to industrial expansion in Lewis's model are easily illustrated. A rise in the real wage in industry will shift the g_I curve inwards which will choke industrial expansion unless there is an equivalent increase in agricultural productivity shifting the g_A curve outwards (see the quote from Lewis on p. 99).

A final implication of the model is that if through time agriculture is subject to diminishing returns, productivity in agriculture will fall, shifting inwards the g_A curve and reducing the rate of industrial growth. If the g_I curve is relatively stable, industrial growth depends fundamentally on the rate of land saving innovations (technical progress) in agriculture to offset the effect of diminishing returns.

Rural–Urban Migration and Urban Unemployment

When Lewis wrote he mentioned an urban–rural wage differential of approximately 30 per cent to attract labour to the industrial sector. What has happened in recent years, however, is that the urban–rural wage differential has widened considerably beyond this level – there has been rural–urban migration on an unprecedented scale, but the expansion of the industrial sector has not generated sufficient employment for all those available to work. Migration has thus served to transfer unemployment from rural to urban areas, as described in Chapter 1. The informal economy of the urban sector harbours the bulk of this labour in transition from the rural sector into industrial employment. The conclusion to be drawn in that the *expected* value of the urban wage, notwithstanding the probability of long spells of unemployment, still exceeds the wage in the rural sector, and as long as it does the process of migration will continue. In these changed circumstances, development theory has focused its attention in recent years on urban unemployment and on policies to combat it. Most of the models of the rural–urban migration process are pessimistic about reducing the level of urban unemployment by conventional means such as subsidies to labour or public-works programmes in the urban areas. The reason is that migration from the land is made to be a function not only of the *actual* urban–rural wage differential but also of the level of employment opportunity. More employment opportunities reduce unemployment immediately but encourage more migration. It thus becomes an empirical question whether increasing the rate of growth of employment in urban areas will actually reduce unemployment. The very real possibility exists, however, that urban areas may be caught in a 'high level unemployment equilibrium trap' as long as surplus labour on the land remains and development policy concentrates new activity in established urban (industrial) centres.

One of the earliest and simplest models of the rural–urban migration process, which is also operational in the sense of being testable, is that of Todaro (1971). Let us consider its main features and implications.

The supply of labour to the urban sector is assumed to be a function of the *expected* urban–rural wage differential, where the *expected* urban–rural wage differential is equal to the *actual* urban wage times the probability of obtaining a job in the urban sector minus the average rural wage. Thus:

$$S = f_s(d) \qquad (3.1)$$

where S is the supply of labour to the urban sector, and

$$d = w\pi - r \tag{3.2}$$

where w is the urban real wage, r is the average rural wage, and π is the probability of obtaining a job in the urban sector.

The probability of obtaining a job in the urban sector is assumed to be directly related to the rate of new job creation and inversely related to the ratio of unemployed job-seekers to the number of existing job opportunities,[1] i.e.

$$\pi = \frac{\gamma N}{W - N} = \frac{\gamma N}{U} \tag{3.3}$$

where γ is the net rate of new urban job creation, N is the level of urban employment, W is the total urban labour force,[2] and U is the level of urban unemployment. Substituting (3.3) into (3.2) gives:

$$d = \frac{w\gamma N}{U} - r \tag{3.4}$$

If it is assumed the migration will come to a stop when the *expected* urban wage equals the rural wage (i.e. when $d = 0$), we can derive from (3.4) the equilibrium level of unemployment as:

$$U^e = \frac{w\gamma N}{r} \tag{3.5}$$

It can be seen from (3.5) that a reduction in the *actual* urban wage will reduce the equilibrium level of unemployment, and a rise in the rural wage will also reduce it, but (paradoxically) an increase in the rate of new job creation will *raise* the equilibrium level of unemployment by increasing the probability of obtaining a job and encouraging migration. Whether policies such as wage subsidies can reduce unemployment therefore depends on whether the increase in the demand for labour as a result is greater or less than the induced supply.

From equation (3.5) we can solve for the equilibrium ratio of unemployment to employment and give some quantitative content to the model. Dividing both sides by N gives $U^e/N = w\gamma/r$. Thus, for example, if the industrial wage is twice as high as the rural wage ($w/r = 2$), and $\gamma = 0.05$, the equilibrium ratio of unemployment to employment will be 10 per cent.

To consider the policy implications more fully, and to answer the question 'under what conditions will the actual level of urban unemployment rise', let us suppose that the rate of urban job creation is a function of the urban wage, w, and a policy parameter, a (e.g. a government policy variable to increase employment). Thus:

$$\gamma = f_d(w, a) \qquad \frac{\partial \gamma}{\partial a} > 0 \tag{3.6}$$

If the growth of urban labour demand is increased, the response of labour supply can be written:

$$\frac{\partial S}{\partial a} = \frac{\partial S}{\partial d}\frac{\partial d}{\partial \gamma}\frac{\partial \gamma}{\partial a} \tag{3.7}$$

Now from (3.4) by partial differentiation, we have:

$$\frac{\partial d}{\partial \gamma} = w\frac{N}{U} \tag{3.8}$$

Substituting (3.8) into (3.7) gives:

$$\frac{\partial S}{\partial a} = \frac{\partial S}{\partial d}\frac{wN}{U}\frac{\partial \gamma}{\partial a} \tag{3.9}$$

There will be an increase in the absolute level of urban unemployment if the increase in supply in response to a policy change exceeds the increase in the absolute number of new jobs created, that is, if:

$$\frac{\partial S}{\partial d}\frac{wN}{U}\frac{\partial \gamma}{\partial a} > N\frac{\partial \gamma}{\partial a} \tag{3.10}$$

---

[1] This is not statistical probability since π is not bounded between zero and unity. The 'chance' of getting a job would be a better word to use.

[2] Todaro uses the same notation, S, for the total urban labour force as for the supply of migrants. This can be confusing. We therefore use W to stand for the total urban labour force, and S for the supply of migrants.

Now cancelling N and $\partial\gamma/\partial a$ from both sides and multiplying both sides by d/w and U/W, the condition for unemployment to increase becomes:

$$\frac{\partial S/W}{\partial d/d} > \frac{d}{w}\,\frac{U}{W} \tag{3.11}$$

or substituting (3.2) into (3.11):

$$\frac{\partial S/W}{\partial d/d} > \frac{w\pi - r}{w}\,\frac{U}{W} \tag{3.12}$$

In words, equation (3.12) says that unemployment will increase in the urban sector as a result of a policy change to increase employment if the elasticity of the urban labour supply (by migration) with respect to the urban–rural wage differential exceeds the expected urban–rural wage differential as a proportion of the urban wage times the unemployment rate. Equation (3.12) is obviously testable. It transpires, in fact, that equation (3.12) is satisfied with a very low elasticity. For example, suppose that the actual urban wage is twice the rural wage,[1] that the probability of obtaining a job in the urban sector is 0.8 and that the unemployment rate is 10 per cent, then the level of unemployment will increase if the elasticity of the urban labour supply with respect to the expected urban–rural wage differential is 0.03.

Note that the growth of total labour *supply* as a result of migration ($\partial S/W$) is not the same thing as the rate of growth of migration ($\partial S/S$), so that the elasticity of *supply* with respect to a change in job opportunities is not the same thing as the elasticity of *migration* with respect to a change in job opportunities. We could, however, convert equation (3.12) into the elasticity of migration with respect to $\partial d/d$ by multiplying both sides of (3.10) by U/S instead of U/W. This would give:

$$\frac{\partial S/S}{\partial d/d} > \frac{w\pi - r}{w}\,\frac{U}{S} \tag{3.13}$$

Since the ratio of unemployment to migration (U/S) is much higher than U/W, the elasticity of migration itself would have to be higher than the elasticity of labour supply for unemployment to increase following a job expansion programme. If, as before, we assume $w/r = 2$ and $\pi = 0.8$ and, say, $U/S = 2$, the migration elasticity would have to exceed 0.6 for unemployment to rise. In principle, this elasticity is easy to estimate by specifying a migration function in which migration is a function of the expected urban–rural wage differential holding constant other factors affecting migration. For an interesting case study, see the study of Tanzania by Barnum and Sabot who estimate an elasticity of migration with respect to the urban wage itself, holding other things constant, of between 0.7 and 2.0.[2]

Disguised Unemployment: Types and Measurement

The higher the marginal product of labour in agriculture, the greater the force of the neoclassical argument that it is the growth of the agricultural surplus that determines the growth of non-farm employment. We must now examine more critically the classical assumption of unlimited supplies of labour, defined as marginal product below the subsistence wage.

If the marginal product of labour in the rural sector is positive (which is not precluded in Lewis's model as long as it is below the subsistence wage), the withdrawal of labour from the subsistence sector will reduce total output. To argue that development via unlimited supplies of labour is feasible and relatively painless must implicitly

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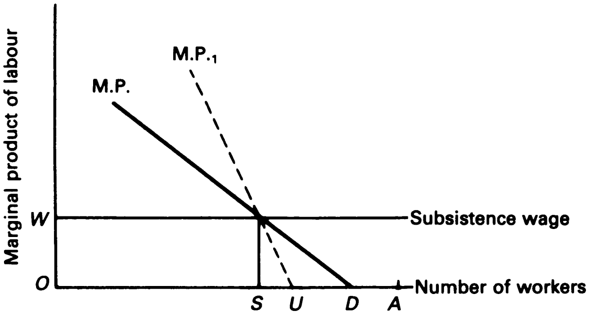
[1] Any values can be substituted as long as $w/r = 2$.

[2] Barnum and Sabot (1977). Other recent studies of the rural–urban migration process include Knight (1972). For a survey of studies, see Todaro (1976). Todaro gives an alternative way of evaluating whether urban unemployment will rise or not. It can be shown that the *level* of unemployment will rise if $\eta > g \times N/S$, where η is the period elasticity of induced migration with respect to the change in modern sector job probabilities; g is the growth of urban employment prior to the increase in job opportunities; N is the level of urban employment and S is the existing level of rural–urban migration. It can also be shown that the *rate* of urban unemployment will rise if $\eta > g \times W/S$, where W is the urban workforce.

Figure 3.8



assume that the marginal product of labour is virtually zero. The term 'disguised unemployment' is usually defined loosely in this way. But the question arises of how workers can survive on the land if their marginal product is zero, or even positive but below subsistence. Who would employ such labour? Would output in the subsistence sector really remain unaffected if substantial quantities of labour migrated? In short, what precisely is meant by the term 'disguised unemployment'? Can it be quantified, and what are we to make of the argument that industrial development in surplus-labour economies is a relatively painless process?

Let us redraw **Figure 3.1** from the point of diminishing returns and describe more formally three possible interpretations of the concept of disguised unemployment which are commonly found in the literature. Let *OA* in **Figure 3.8** be the actual number of workers employable. One possible measure of disguised unemployment is the difference betwen *OA* and *OS*, or the gap between the number of workers available for work and the amount of employment which equates the marginal product of labour and the subsistence wage. This is the definition of unlimited supplies of labour in Lewis's model where, if the marginal product of labour is below the institutional or subsistence wage, landowners have no interest in retaining these workers and therefore do not compete for them with the industrial sector.

A second possible measure of disguised unemployment is the difference between *OA* and *OD*, or the gap between the actual number of workers available for employment and the level of employment at which the marginal product of labour is zero, which is sometimes referred to as the **static surplus**. This surplus is obviously less than if disguised unemployment is defined as labour with a marginal product below the institutional or subsistence wage.

A third measure of disguised unemployment is the difference between the actual number of workers available and the level of employment at which the marginal product of labour would be zero if some change occurred which enabled the same level of output to be produced with fewer men. This is represented by a pivoting of the marginal product curve to MP_1. Disguised unemployment is now measured by the difference between *OA* and *OU*, which is sometimes referred to as the **dynamic surplus**. The dynamic surplus clearly embraces many 'types' of disguised unemployment because there are many reasons, particularly in developing countries, why labour may not be fulfilling its potential and why small changes in technique and organisation of production may release substantial quantities of labour.

There are three main ways of ascertaining whether surplus labour exists in the sense that labour's marginal product is zero. The first is to examine instances where substantial numbers of the agricultural labour force have been withdrawn from the land, either to work on some industrialisation project, or as the result of illness, and to observe whether agricultural output falls or not. This method was followed by Schultz (1964), who examined the effect of the influenza epidemic in India in 1918–19 which killed off approximately 8 per cent of the agricultural labour force. He found that acreage, and output in the following year, declined, and concluded from this that surplus labour in Indian agriculture did not exist. An important criticism of Schultz's study, however, is that he failed to distinguish between the summer and winter season of the year following the epidemic. Mehra (1966) has shown that summer production which just followed the epidemic was not in fact reduced and that the decline in agricultural production in 1919–20 found by Schultz was entirely due to a reduction in the winter crop which could have resulted from a low rainfall. Even if there was no surplus labour in 1920, however, it could exist today in India and elsewhere in the changed circumstances of rapid population growth, especially since 1940.

A second method of estimating the static surplus is to take the difference between labour available and the labour required to produce the current level of agricultural output *with given techniques*, making due allowance for the seasonality of production. The estimate of the magnitude of surplus labour in this case will vary with local conditions, and what is regarded as a normal working day.

A third method of approach is to estimate agricultural production functions (see Chapter 2) to test whether the elasticity of output with respect to labour input is significantly different from zero or not. This approach indicates whether there is surplus labour or not, but does not measure its magnitude.

In discussing labour's marginal product in agriculture and the extent of disguised unemployment, two important distinctions need making: between harvest and non-harvest time; and between farms which hire labour and those which do not. Within the production-function approach this distinction is easily made explicitly and is a very fruitful approach for that reason. As far as the distinction between hired and non-hired labour is concerned, the marginal product of family labour can hardly be zero if workers are hired, nor can the marginal product of the hired workers themselves be zero if they are paid. Desai and Mazumbar (1970) have taken a sample of Indian farms and divided it into those using hired labour and those not. Differences between the two groups are striking. The marginal product of labour on the farms hiring labour is significantly different from zero; on farms not hiring labour the marginal product is not significantly different from zero. 'It should be remembered, however, that zero marginal product per man-hour or per man-day is not a necessary condition for surplus labour. Surplus labour can take the form of a small number of hours or days worked. On the other hand, if the marginal product per man-hour or man-days is zero, there must be some surplus labour, and presumably it is the tip of the iceberg.

As far as the distinction between harvest and non-harvest labour is concerned, Nath (1974) suggests that busy-season and slack-season labour inputs should be included as separate arguments in the production function. He adopts this approach in a cross-section analysis of 150 farms in the Ferozepur district (Punjab) in India for the period 1967–8, relating annual output to busy-season labour, slack-season labour and other inputs, using a Cobb–Douglas production function (see p. 69). Nath finds not unexpectedly, that the marginal product of busy-season labour is indeed positive, but that the marginal product of slack-season labour is not significantly different from zero.

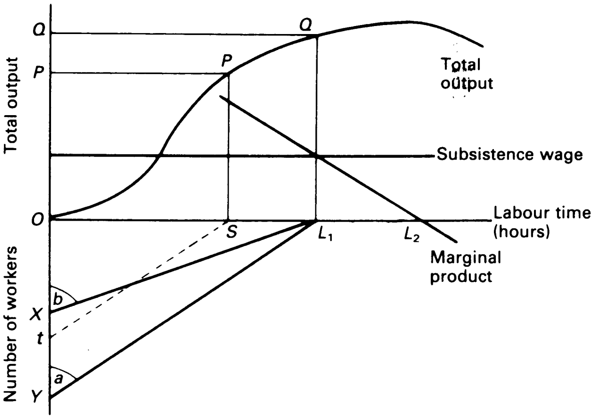
The conclusion from all these studies is that the marginal product of labour on family farms with no hired labour in the slack season may well be zero. In this sense, a static surplus exists. But where agriculture is partly commercialised, and in the harvest season, the marginal product of labour is positive, and reductions in the agricultural labour force would impair agricultural output. Defenders of the classical model of development (e.g. Marglin (1966)) claim, however, that no one has ever argued that the withdrawal of labour under *all* circumstances will not affect output. The purpose of the classical model is to draw attention to the fact that the marginal product in industry far exceeds the opportunity cost of labour in agriculture, and those who use the classical model normally stipulate some dynamic change as migration takes place.

This leads to the question of the measurement of the dynamic surplus, which is the difference between the actual labour employed and the labour required given some small change in technique (including an increase in the number of hours worked per day).

Unfortunately, investigators who have measured the dynamic surplus have not generally distinguished between the causes of the surplus, or made explicit the assumptions on which their estimates of labour requirements are based, and this is a major reason why estimates and opinions differ on the extent and existence of disguised unemployment. If the surplus is measured simply by the difference between the amount of labour that, in the investigator's opinion, should be necessary to produce a given output and the amount of labour that there actually is, this does not distinguish between low productivity due to such factors as poor health, lack of incentive, a preference for leisure, primitive technology or the seasonal nature of production. There may be genuine differences in the extent of disguised unemployment within and between countries; on the other hand, different investigators may have been estimating different things. We have already seen that a large part of the observed labour surplus may result from the seasonal nature of production. Studies which exclude this possibility will certainly overestimate the existence of disguised unemployment. What this also means, however, is that the introduction of small amounts of capital to substitute for labour at times of peak demand could release substantial quantities of workers for the industrial sector without agricultural output falling. If disguised unemployment is seasonal unemployment, the dynamic surplus may be very large indeed.

An attempt has been made to define a set of logically distinct types of disguised unemployment to avoid this confusion and conflict (Robinson (1969)). Five 'types' of disguised unemployment are distinguished: first, unrealised potential output per worker due to low nutritional and health levels of the labour force; second, low levels of output per unit of labour input due to inadequate motivation for the cultivators to pursue maximisation; third, low average product due to low aspirations for material income as compared to leisure; fourth, unemployment due to the lack of cooperating factors ('technological' unemployment); and last, seasonal unemployment. Even with a logically distinct classification of the causes of disguised unemployment, however, measurement will still be arbitrary depending on the investigator's judgement of the potential level of output if the causes of low output were to be removed. Ideally, studies of disguised unemployment must be micro-orientated, based on detailed information of actual and potential labour utilisation, and with the assumptions of the analysis explicitly stated.

Figure 3.9



A reconciliation between those who argue that there is such a phenomenon of disguised unemployment, in the sense of a very low marginal product of labour in agriculture, and those who disagree, is provided by the distinction between **the amount of labour time employed and the number of men employed.** In a wage-payment system it is, indeed, extremely unlikely that labour would be used up to the point where its marginal product is zero. If the wage is positive, so will be the marginal product. But profit-maximising behaviour is quite consistent with redundant labour. Labour is employed up to the point where the marginal product of a unit of labour *time* is equal to the wage, and **disguised unemployment takes the form of a small number of hours worked per person.** It is not that there is too much labour time but too many labourers spending it. Total output would fall if men were drawn from the land unless those remaining worked longer hours to compensate. How much disguised unemployment is estimated to exist depends on what is regarded as a normal working day. Estimates may be subjective, as with the dynamic surplus, but unlimited supplies of labour exist in the classical sense provided those remaining on the land work harder or longer. Let us illustrate these points diagrammatically.

In **Figure 3.9** total output is measured on the vertical axis above the origin, and the amount of labour time on the horizontal axis. Let L_1 be the point where the marginal product of labour time is equal to the subsistence wage corresponding to total output OQ. The number of workers is measured on the vertical axis below the origin, so that the tangent of the angle OYL_1 (tan a) gives the average number of hours worked by each unit of labour. If the tangent of the angle OXL_1 is regarded as the normal length of a working day so that the same output, OQ, could be produced by OX labour instead of OY, the amount of disguised unemployment would be equal to XY. It can easily be seen that if there was a reduction in the labour force from OY to Ot and the number of hours worked per man remained the same (i.e. tan OtS = tan OYL_1), total output would fall from OQ to OP. If the normal working day is considered to be greater or less than the hours given by tan b, the amount of disguised unemployment will be greater or less than XY. Let us now give a practical example. Suppose a producer employs 10 men ($OY = 10$), each doing five hours' work a day (tan $a = 5$), and that the marginal product of the 50th hour is equal to the subsistence wage ($L_1 = 50$). If one man leaves (say Yt), total output will fall from OQ to OP unless the 9 workers now do the 50 hours' work previously done by 10 workers, i.e. the working day must be increased by $\frac{5}{9}$ of an hour. The amount of disguised unemployment depends on what is considered to be a full day's work. If ten hours is considered normal, then only 5 workers would be required to do 50 hours' work and 5 could be regarded as disguisedly unemployed.

The precise conditions under which the remaining labour force would supply more work effort have been formalised by Sen (1966). If workers are rational, they will work up to the point where the marginal utility of income from work (dU/dL) is equal to the marginal disutility of work (dV/dL). Now the marginal utility of income from work can be expressed as:

$$\frac{dU}{dL} = \frac{dY}{dL} \cdot \frac{dU}{dY} \tag{3.14}$$

where dY/dL is the marginal product of labour and dU/dY is the marginal utility of income. Welfare maximisation therefore implies:

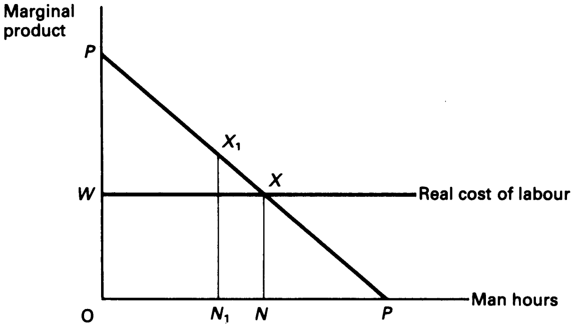
$$\frac{dY}{dL} \cdot \frac{dU}{dY} = \frac{dV}{dL} \tag{3.15}$$

or

$$\frac{dY}{dL} = \frac{dV}{dL} \div \frac{dU}{dY} = \frac{\text{marginal disutility of work}}{\text{marginal utility of income}} \tag{3.16}$$

Sen defines the ratio of the marginal disutility of work to the marginal utility of income as the **real cost of labour**. Now consider **Figure 3.10**:

Figure 3.10



Equilibrium is at N where the marginal product is equal to the real cost of labour. The removal of one man reduces total output from $OPXN$ to $OPX_1\,N_1$, and marginal product rises from X to X_1. Equilibrium will be restored again at N if the real cost of labour remains constant, that is, if the ratio of the marginal disutility of work to the marginal utility of income does not increase. If the real cost of labour rises, there will not be full compensation for output lost. In other words, disguised unemployment in the sense of *zero* marginal product (or full compensation for lost output) implies a non-increasing marginal disutility of work and a non-diminishing marginal utility of income. Sen gives a number of reasons why this may be the case for people near subsistence with little work and a lot of leisure; for example, rising aspirations, and more public expenditure on such things as education, may increase the marginal utility of income, and higher incomes may decrease the marginal disutility of work if people are better fed.

The amount of underutilised labour is likely to be greater, the less capitalistic is the organisation of agriculture. In fact, in the extreme situation of no wage-payment system, no competitive pressure, and little desire to maximise, the distinction between a unit of labour and a unit of labour time becomes largely redundant in support of the classical model. It is perhaps this type of environment which originators of the classical model primarily had in mind. In an extended family-type system, for example, the marginal product of both workers and labour time may be below the subsistence wage. It is the *average* product that matters for the group as a whole, not the product of the last man or hour, and the average product may still be above the subsistence level when the marginal product of labour time is below. It is difficult to represent both cases on the same diagram, but if the marginal product of labour is zero, the marginal product of labour time is bound to be zero (and probably negative), so we may continue to illustrate the argument in terms of labour time, as in **Figure 3.11**.

Figure 3.11

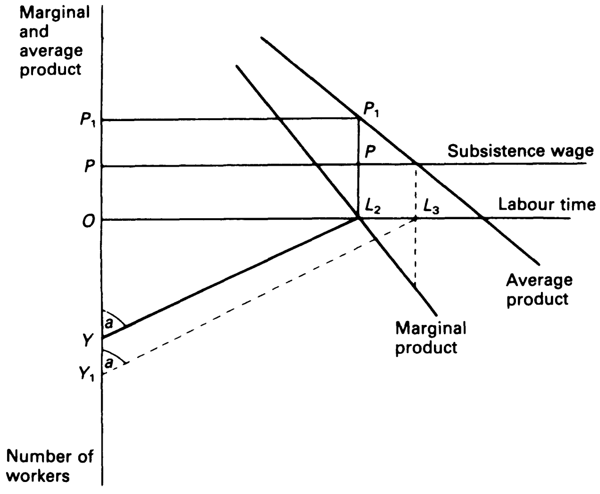
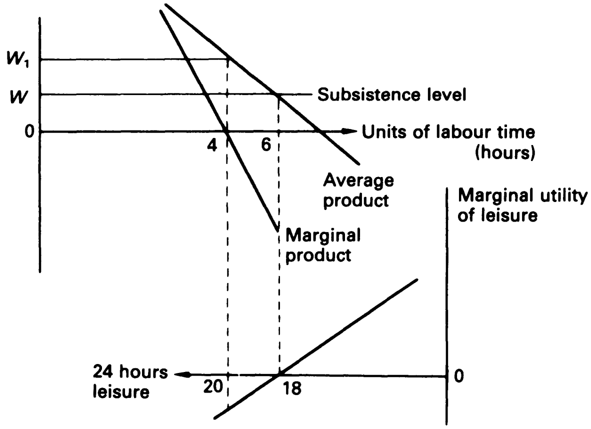


Figure 3.12



The basis of **Figure 3.11** is the same as **Figure 3.9**. When the marginal product of labour time is zero at L_2 the average product of labour time is OP_1, or PP_1 in excess of the subsistence wage OP. The amount of labour time could be extended to OL_3 without the average product of labour time falling below subsistence, and the amount of labour time could be made up of any combination of workers and hours worked. If the number of workers was OY_1 they could work hours equal to the tangent of OY_1L_3 without the average product of labour time falling below subsistence. Even though the marginal product of labour time, L_2L_3, is negative, all workers can subsist if the total product is equally shared. A zero or negative marginal product of labour time is not inconsistent with rational worker behaviour if positive utility is attached to work regardless of the effect on output. Suppose, as in **Figure 3.12** (adapted from Uppal (1969)), that the marginal product of a unit of labour time is zero after four hours' work but the marginal disutility of leisure is still negative at this point. The worker may substitute work for leisure, working, say, six hours, despite the fact that the marginal product of labour time is negative after the fourth hour. If such behaviour is observed, the presumption must be that the marginal utility attached to working exceeds the loss of utility resulting from a lower average product. The fact that people receive positive utility from work may partly explain why work habits in poor countries seem more leisurely than in advanced countries. What could be done in X hours is done in $X + Y$ hours.

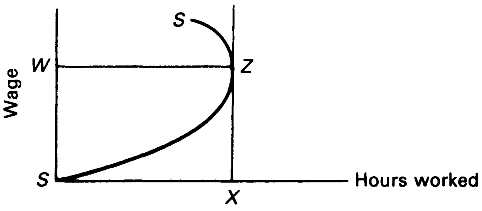
As long as the marginal product of labour is zero, labour could be drawn from the land without total output falling. In fact, in our example with OY_1 workers, working tan *a* hours, labour drawn from the land would increase total output because the marginal product of labour time is negative. Y_1Y labour could be released without the labour that remains working any longer or harder. If negative marginal product can exist in practice, this would be disguised unemployment of an extreme form. If labour time does not extend beyond the point of zero marginal product, however, we should reach our earlier conclusion that disguised unemployment takes the form of a small number of hours worked per person, which is perhaps more accurately described as 'underemployment'.

Incentives and the Costs of Labour Transfers

Whether workers are willing to work more intensively to compensate for lost production as labour migrates, or whether capital is substituted for labour to raise productivity, requires some discussion of worker motivation, and attitudes to industrialisation in general, in a predominantly agricultural economy.

Some economic incentive will almost certainly be required to induce agricultural labour to work extra hours. At least there will need to be goods with which to exchange their surplus production. It is sometimes argued, however, that peasant producers, accustomed to a traditional way of life, may not respond to such incentives – that their horizons are so limited that they have no desire to increase their surplus either by installing capital or working longer hours. The corollary of this argument is that as labour productivity increases, workers will ultimately reduce the number of hours they work. This is the notion of the **backward-bending supply curve of effort**, illustrated in **Figure 3.13**. *SS* is the supply curve of effort relating hours worked to the wage, determined by productivity. Total income is equal to the product of hours worked and the wage. Up to income level *SWZX*, supply responds positively to the wage. Beyond the wage *SW*, however, fewer hours will be offered. This is the point where the positive substitution effect of work for leisure (leisure is more 'expensive' the higher the wage) is offset by a negative income effect because of low aspirations. A backward-bending supply curve of effort is not necessarily indicative, however, that peasants work for a fixed income and no more. The total income from work effort will still increase as long as hours worked fall less than in proportion to the increased wage. But the need for incentives implies a claim on the community's real resources, which creates added difficulties for the argument that a pool of disguised unemployment can be used to build up 'productive' goods, and to expand the industrial sector, in a 'costless' way. Not only may the opportunity cost of agricultural labour not be zero but resource costs will also be involved in providing incentives to increased effort and productivity in order for resources to be released from agriculture in the first place. The resource costs will include the provision of investment goods in agriculture, consumer goods for peasant producers to buy and social capital in the industrial sector to cater for migrants.

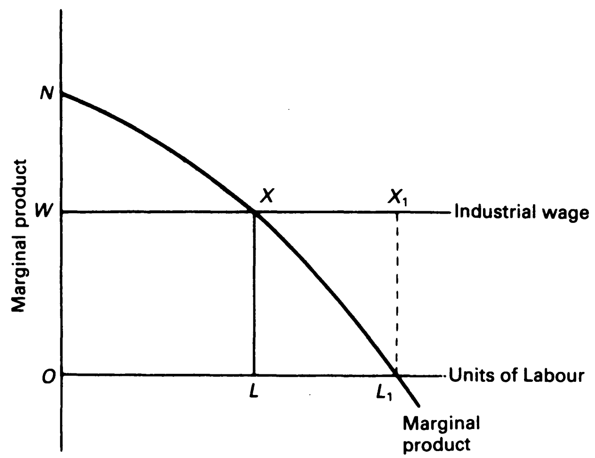
Figure 3.13



All this has an important bearing on the question of the valuation of labour in surplus-labour economies when planning the social optimum allocation of resources and deciding on the degree to which activities in the industrial sector should be labour-intensive. Even if labour's opportunity cost is negligible, the resource costs of labour transference must be considered as a cost to the community in expanding the industrial sector.

There is also the question of increased consumption to consider. If the objective of a surplus-labour economy is to maximise growth, as opposed to the level of current consumption, the

Figure 3.14



transference of labour will also involve a further 'cost' in terms of increased consumption because there will be a reduction in the size of the capitalist surplus if labour is valued at its opportunity cost. Consider **Figure 3.14**. The diagram represents the capitalist sector of the economy. On the normal assumption of profit maximisation, labour will be employed up to the point where the marginal product is equal to the industrial wage. The capitalist surplus is equal to *WNX*. But suppose the supply of labour to the industrial sector is assumed 'costless' to society and is given, by the planners, a notional (or shadow) wage of zero. In this planned system labour would be employed up to the point OL_1. Given the industrial wage, *OW*, and assuming the propensity to consume out of wages is unity, each additional unit of labour employed beyond *OL* will involve consumption in excess of production. If LL_1 additional labour is employed, the size of the investible surplus would be reduced by XX_1L_1. It follows that in an economy geared to growth the relationship between the consumption and production of migrant labour must also be taken into account in estimating the costs to society of industrial expansion with surplus labour from agriculture. If at the margin additional saving is valued more than an additional unit of consumption, the cost of a unit of labour transferred from agriculture to industry must include an allowance for increased consumption. These matters are taken up more fully in Chapter 8 in the discussion of the determination of the shadow wage.

Questions for Discussion and Review

1. What is the importance for economic development of rapid productivity growth in agriculture?
2. What factors determine productivity growth in agriculture?
3. How could land reform help to raise agricultural productivity?
4. What is meant by the concept of the 'marketable surplus'?
5. Explain why poor people tend to be risk-averse and reluctant to innovate.
6. In what senses is there disguised unemployment on the land?
7. Does disguised unemployment on the land mean that development using surplus labour is a relatively painless and costless process?
8. Compare and contrast the main features of Lewis's classical model of development with the neoclassical model.
9. Explain the continued process of rural–urban migration despite growing unemployment in urban areas.
10. In what ways are the agricultural and industrial sectors of an economy complementary to one another?

■ Chapter 4 ■

Capital and Technical Progress

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The Role of Capital in Development

The capital stock of a country increases through the process of net investment (*I*), which is the difference between a country's net income in an accounting period (i.e. gross income minus depreciation) and how much it consumes out of that income in the same period. Capital accumulation enlarges a country's capacity to produce goods. As we saw in Chapter 2, however, production-function studies, at least for advanced countries, cast some doubt on whether capital accumulation by itself is central to the development process. A lot depends on how capital is defined and whether it is inclusive of technological progress. Capital is certainly a wider concept than capital goods traditionally defined, i.e. goods which yield no immediate utility but produce goods which do. If capital is defined as any asset which generates an additional future stream of measurable income to society, many goods and services commonly regarded as consumption goods ought strictly to be included as part of a country's capital stock. Expenditure on education, for instance, which may permanently enhance the earning capacity of individuals, as well as giving immediate satisfaction, must be regarded partly as investment expenditure. Similarly, if certain types of 'consumption' goods, e.g. clothes, durable consumer goods, etc., are necessary to induce peasant producers in the agricultural sector to increase their productivity, they, too, ought to be considered as part of the capital stock. If it is agreed, therefore, that the only way to build up a country's productive potential, and to raise *per capita* income, is to expand the capacity for producing goods, this need not refer simply to the production of physical capital but to the production of other types of capital such as 'incentive' consumer goods and the expansion of facilities for investment in human capital, all of which can contribute to increased productivity and higher living standards. In addition, there is the very important type of capital referred to as 'social capital' which again need not produce other goods directly, but none the less expands the capacity to produce by facilitating the smoother operation of directly productive activities. Housing and transport facilities are obvious examples. If the production-function approach to the analysis of growth is to be employed, it is of the utmost importance to define investment and the capital stock as meaningfully as possible if the relation between capital and growth is not to be misconstrued. This is in addition to the fact, which we dwelt on at some length in Chapter 2, that capital accumulation may be the main vehicle for the introduction of technical progress in the productive system. The rate of technical progress in the capital-goods sector itself is also important because this will determine the price of capital relative to labour.

Developing economies themselves lay great emphasis on the importance of capital accumulation, and stress the need to raise the level of investment in relation to output. A glance at any national development plan will testify to this. Development is associated with industrialisation and industrialisation with capital accumulation. Many development economists also see investment as the most important single factor in the growth process. Professor Rostow (1960) defines the process of 'take-off' into sustained growth in terms of a critical ratio of investment to national product, and Professor Arthur Lewis (1955) has described the process of development as one of transforming a country from being a 5 per cent saver and investor to a 12 per cent saver and investor. It is common, in fact, for countries to calculate fairly precise ratios of investment to national income that will be required either to achieve a particular rate of growth or to prevent capital per head or income per head from falling. These calculations involve assumptions about the normal relation between capital and output, a relation which is formally expressed in the concept of the **capital–output ratio** (which we shall consider later). Professor Johnson (1969, p. 9) singles out capital accumulation in its widest sense as the distinguishing characteristic of development, and has described the structural transformation of economies as a generalised process of capital accumulation: 'The condition of being "developed" consists of having accumulated, and having established, efficient social and economic mechanisms for maintaining and increasing large stocks of capital per head in the various forms. Similarly the condition of being "underdeveloped" is characterised by the possession of relatively small stocks of the various kinds of capital.'

The emphasis on investment in developing countries may not be without foundation despite the findings for advanced countries that capital accumulation seems to have made only a relatively minor contribution to measured growth in the present century. For one thing, capital is a broader concept than some of these studies admit. Second, even if capital is relatively unimportant in developed countries, there may be a fundamental difference between countries which already have large quantities of capital per head and those which do not. In countries where specialisation and the division of labour is minimal, the scope for capital to permit more roundabout methods of production, and to increase productivity, may be greater than where specialisation has already reached a high level of sophistication. Moreover, in technologically backward countries the rate of growth of capital required to absorb new technology is likely to be greater than in advanced countries. By definition, technologically backward countries also have a backlog of technology to make up. Furthermore, in a labour-abundant economy, with a low capital–labour ratio, the very act of capital deepening – giving each worker a little more capital to work with – may make a substantial difference to total product – much more so than in countries where the process of capital deepening has been a continuing process for some length of time. All these factors represent important contributions that capital can make to economic progress, which may be relatively more important the smaller is the initial capital stock of a country relative to its population. It is a familiar economic proposition that the scarcer is one factor of production in relation to another, the higher is its productivity, other things being equal.

Capital accumulation is also seen as the escape from the so-called 'vicious circle of poverty' – a circle of low productivity, leading to low *per capita* income, leading to a low level of saving per head, leading to a low level of capital accumulation per head, leading to low productivity. Low productivity is seen as the source of the 'vicious circle of poverty', and the point where the circle must be broken by capital accumulation.

Since productivity can be raised by other means as well, there is implicit in the argument the pessimism that no further reorganisation of the existing factors of production could have much impact on output, and that technical progress is mainly embodied, requiring net additions to the capital stock. Whether this pessimism is justified is an empirical question in the final analysis, but the emphasis placed by developing countries on capital accumulation is very real.[1]

The Capital–Output Ratio

The link between capital and output is embodied in the concept of the capital–output ratio, which can measure in physical units, or in value terms, either the average or the marginal relation between capital and output. The **average capital–output ratio** of an economy is the stock of capital divided by the annual flow of output (K/O), while the **marginal or incremental capital–output ratio (ICOR)** measures the relation between increments to the capital stock and increases in output ($\Delta K/\Delta O$ or $I/\Delta O$). If the gross value of a country's stock of capital is £100 million and its gross annual income is £25 million, the average capital–output ratio would be 4 : 1. If the economy grows smoothly at full capacity, the incremental capital–output ratio will approximate to the average, so that in this example four *extra* units of capital would be required to produce an *additional* unit flow of output (in £s).

With fluctuations in income, however, the average capital–output ratio may differ substantially from the ICOR. In periods of recession the average capital–output ratio will tend to be higher than its 'normal' value since output will be depressed in relation to the size of the capital stock, which is relatively fixed. But while the average ratio is still high at the start of the upturn of the business cycle, the incremental ratio will appear low. If the economy is working below capacity, very little extra capital will be needed to increase output and substantial growth may be associated with a relatively small ICOR. In attempting to calculate ICORs, the stage of the business cycle must always be borne in mind.

The dependence of the ICOR on the level of activity raises the question of whether it is legitimate to treat the capital–output ratio as an independent variable in the economic system, and to use the ratio as a parameter in investment planning. Is not the ratio the dependent variable in the system determined by the level of investment and the rate of growth? This is a fairly crucial question to consider, because it is common for countries to use an aggregate ICOR, and also incremental capital–output ratios for sectors of the economy, for deciding on the rate of investment necessary to achieve a particular target rate of growth of income. Yet if the ratio itself is determined by the rate of growth, is this permissible? As we shall come to see, a lot depends on the length of the time period over which investment is being planned.

Taking both time-series and cross-section data, there is substantial empirical evidence of a strong inverse relation between growth and the value of the ICOR[2] and good theoretical reasons for believing that the ICOR is the dependent variable in the relation. Two main reasons can be advanced. First, the investment rate tends to be more stable than other factors, so that growth may increase or decrease while the rate of capital accumulation remains virtually unchanged. The inverse relation would be less marked if capital–output ratios were computed by taking a measure of capital services, rather than the stock of capital, but this is not normally the case. Second, if the significance of non-capital inputs in the growth process is greater than that of capital, there will be an inverse relation between the investment rate and the capital–output ratio. This means that if the relation between growth and the investment rate is positive (which no one disputes), the relation between growth and the capital–output ratio will be negative.

Let us illustrate these points by making use of the Cobb–Douglas production function. From the equation in its estimating form, $r_O = r_T + \alpha r_K + \beta r_L$, the ICOR is given by:

$$\frac{\Delta K}{\Delta O} = \frac{\Delta K/O}{r_T + \alpha r_K + \beta r_L}$$

---

[1] See the discussion by W. B. Reddaway 'Some Reflections by a Keynesian Economist on the Problems of Developing Countries', in Thirlwall (ed.) (1987).

[2] E.g. see Leibenstein (1966); and Vanek and Studenmund (1968).

where $\Delta K/O$ is the investment ratio. Now if $\Delta K/O$ is stable and r_T and r_L vary more than r_K, $\Delta K/\Delta O$ and r_O will vary in opposite directions. Likewise, if the growth of the labour-force and technical progress contribute more to growth than capital accumulation, $\Delta K/\Delta O$ and r_O will vary in opposite directions. In the short run, therefore, a low measured ICOR more probably implies that growth has been rapid, and not that relatively rapid growth will be associated with a low ratio of investment to output because the ICOR is low.

The use of the incremental capital–output ratio for estimating the amount of investment required to increase output by a given amount was inspired by the work of **Harrod and Domar** (see p. 6 and references). Although their work was originally designed to establish the conditions for equilibrium growth, their fundamental equations have been put to various alternative uses. Harrod's basic growth equation is $Gc = s$, where G is the rate of growth ($\Delta O/O$), c is the ICOR ($I/\Delta O$) and s is the savings ratio (S/O). By substituting terms it can be seen that the equation merely expresses the *ex post* identity that saving equals investment, which follows from the accounting identities that income equals consumption plus investment and income equals consumption plus saving. None the less, it is this equation that has been endlessly manipulated to give the savings (or investment) ratio (s) necessary to achieve a particular target rate of growth (G), given the value of c, and to calculate the value of c, given G and s. This is in spite of the fact that no causality is implied by the equation.

The Harrod equation certainly predicts an inverse relation between growth and the ICOR, but since c is assumed constant in Harrod's original model, it is the ICOR that determines growth and not the other way round.

It is not difficult to demonstrate that the exercise of calculating the savings and investment required to achieve a target rate of growth, given c, and the exercise of calculating c, given s and G, are fraught with danger. If the economy has been operating below capacity, there is no telling what is the 'true' value of c, and the investment needed in the short run to produce a given G cannot be calculated with the precision that the equation suggests. Similarly, it is highly misleading to calculate c by dividing the savings or investment ratio by the rate of growth of output. Apart from the fact that the economy may not be working at full capacity, the assumption is being made that all increases in output are attributable to increases in capital, which is untrue. The productivity of capital ($\Delta O/I$) is overstated, and, since the ICOR ($I/\Delta O$) is the reciprocal of the productivity of capital, the ICOR is understated.

This latter problem can be overcome by making the distinction between the actual ICOR, as measured above, and the adjusted ICOR, which is the ICOR adjusted for increases in the supply of other factors (e.g. a 5 per cent increase in the labour force). The concept of the adjusted capital–output ratio takes care of what otherwise appears to be a conflict between the observed productivity of capital and that implied by the value of the actual ICOR. For example, suppose that a country's investment rate is 15 per cent and its growth rate is 5 per cent, giving an actual capital–output ratio of 3 : 1. This would suggest a productivity of capital of 33.3 per cent. But, typically, the rate of return on capital is much less than this. The reason is that other factors contribute to growth. Suppose that the growth of the labour force is such that it contributes 3.5 percentage points to the 5 per cent growth rate, leaving 1.5 percentage points to be 'explained' by capital (assuming no technical progress). In this case, with a 15 per cent investment ratio, the adjusted capital–output ratio is 10 : 1, giving a rate of return on capital of 10 per cent. The actual capital–output ratio is 3 : 1, but if there was no growth of the labour force, the adjusted capital–output ratio tells us that an investment ratio of 50 per cent would be required to grow at 5 per cent. In short, if other factors remain unchanged, much more investment is required to achieve a target rate of growth than is implied by calculations of c from the Harrod equation. The adjusted ICOR is sometimes referred to as the **net incremental capital–output ratio**; that is, the ICOR on the assumption that other factors do not change. Net or adjusted ICORs are difficult to estimate, but clearly the variability of the factors that co-operate with capital in the productive system can play havoc with calculations of the actual ICOR from data on past growth and the investment ratio alone.

When calculations are made of saving and investment requirements to achieve target rates of growth for, say, a five- to ten-year planning period, the normal assumption is that the incremental capital–output ratio will approximate to the average and that over the long term the factors to co-operate with capital will be forthcoming as in the past. For a planning period in excess of five years this assumption may not be unreasonable. Criticisms of the use of the incremental capital–output ratio in investment planning relate more to its use in the short run.

On the other hand, as a result of technical progress, and shifts in the pattern of demand and the distribution of resources between sectors with different productivities, the ICOR may also be subject to secular change. In principle, this should be easier to allow for in investment planning. In practice, in the absence of extensive time series, there may be some dispute as to the direction of the trend. Some economists argue that it is likely to fall as *per capita* incomes rise owing to greater economies of scale, external economies, improvements in the quality of labour and shifts in demand towards service activities requiring less capital. Others argue, however, that it can be expected to rise owing to diminishing returns if capital grows faster than labour, which is normally the case as countries get richer. The only reliable evidence we have relates to advanced countries, which suggests that, in practice, long-run changes in the capital–output ratio are quite small, with the factors leading to increases and decreases in the ratio presumably tending to offset one another.

In the short run, though, as we have said, the ratio may be subject to serious variability either as a result of variations in the supply of co-operating factors or variations in capacity utilisation. In planning the level of investment the issue that must be faced is whether the planning period is long enough for the short-run variability of the ratio not to matter. If the ratio does stay fairly constant over long periods, capital requirements can perhaps be estimated with some accuracy for a ten- to fifteen-year period, but planning investment requirements for anything less than a five-year period on the assumption of a stable capital–output ratio may be asking for trouble.

Finally and briefly, other more obvious dangers may be mentioned of using the capital–output ratio as a basis for investment planning. First, exclusive attention to the capital–output ratio may exaggerate the need for investment when output may be increased by other, simpler means. On the basis of Indian experience, Professor Reddaway (1962) suggests that before calculating the additional capital required to produce a target output, it would be wiser for a developing economy to think first of the output that might reasonably be expected from increased utilisation of existing factors and better methods applied to old capital. Second, the accuracy of any calculations of the capital–output ratio may be called into question in backward economies lacking comprehensive and reliable statistics. Third, it must be remembered that the aggregate ICOR is bound to disguise sectoral differences, and in calculating overall investment requirements some allowance should be made for the changing sectoral distribution of resources.

■ Technical Progress

The term 'technical progress' is used in several different senses to describe a variety of phenomena; but three, especially, can be singled out. First, it is a term used by economists to refer to the *effects* of changes in technology, or more specifically to the role of technical change in the growth process. It is in this sense that we used the term in Chapter 2; that is, as an umbrella head to cover all those factors which contribute to the growth of 'total' productivity. Second, technical progress is used by economists in a narrow specialist sense to describe the character of technical improvements, and is often prefaced for this purpose by the adjectives 'labour-saving', 'capital-saving' or 'neutral'. Third, technical progress is used more literally to refer to *changes* in technology itself, defining technology as useful knowledge pertaining to the art of production. Used in this sense, the emphasis is on describing improvements in the design, sophistication and performance of plant and machinery, and the economic activities through which improvements come about – research, invention, development and innovation.

Having already discussed technical progress in the first sense in Chapter 2, we shall concentrate here on the narrow specialist descriptions of technical progress, and on how societies progress technologically.

Capital- and Labour-Saving Technical Progress

The classification of technical progress as to whether it is capital-saving, labour-saving or neutral owes its origins primarily to the work of Harrod (1948) and Professor Hicks (1932). Their criteria of classification differ, however. **Harrod's classification of technical progress** employs the concept of the capital–output ratio. Given the rate of profit, technical change is said to be capital-saving if it lowers the capital–output ratio, labour-saving if it raises the capital–output ratio, and neutral if it leaves the capital–output ratio unchanged. The nature of technical progress by this criterion will be an amalgam of the effect of 'pure' technical change on factor combinations and the effect of the substitution of capital for labour (as, for example, relative factor prices change). As such, Harrod neutrality at the aggregate level is quite consistent with capital-saving technical progress at the industry level. In fact, most of the evidence for advanced countries suggests that *if* technical progress is neutral in the aggregate in the Harrod sense, this must be due to substitution of capital for labour because 'pure' technical advance has saved capital.

But there is some dispute as to what the aggregate capital–output ratio does actually show, because of alleged biases in the estimates. This is in addition to differences of opinion over the direction of the ratio in the course of development. Some argue that the ratio has fallen and may be expected to fall; others maintain that the ratio has risen and may be expected to rise as development proceeds. The difficulty stems from the perennial problem of defining capital. If certain expenditures, which ought properly to be regarded as adding to the capital stock, are excluded from the measurement of capital, and these expenditures have grown faster than measured capital, the capital–output ratio will be biased downwards. While technical progress may *appear* neutral or capital-saving because of a stable or declining capital–output ratio, it may nevertheless be capital-using and would appear so if the capital stock were more appropriately measured. One notable item not conventionally included in the measurement of the capital stock is investment in human capital. In most advanced countries during the twentieth century investment in human beings has grown faster than physical capital. To the extent that this is true, estimates of the capital–output ratio are biased downwards and would probably show a slight upward trend during the twentieth century if investment in human capital was included in the measurement of capital. We merely stress again the need for defining capital as meaningfully as possible if the relation between factor supplies and growth is to be properly understood.

One important economic reason why technical progress may appear to be capital-using in the Harrod sense is that as countries become richer the price of labour relative to capital tends to rise, which may induce a substitution of capital for labour. As countries mature, capital tends to grow faster than labour and the resulting change in relative prices may not only induce 'pure' substitution but also induce inventive effort towards saving labour which is becoming relatively scarce.

Hicks's classification of technical progress takes the concept of the marginal rate of substitution between factors, which is the rate at which one factor must be substituted for another leaving output unchanged. The marginal rate of substitution is given by the ratio of the marginal products of factors. Holding constant the ratio of labour to capital, technical progress is said to be **capital-saving** if it raises the marginal product of labour in greater proportion than the marginal product of capital; **labour-saving** if it raises the marginal pro-

Figure 4.1

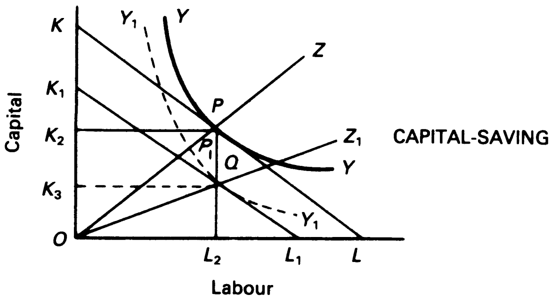
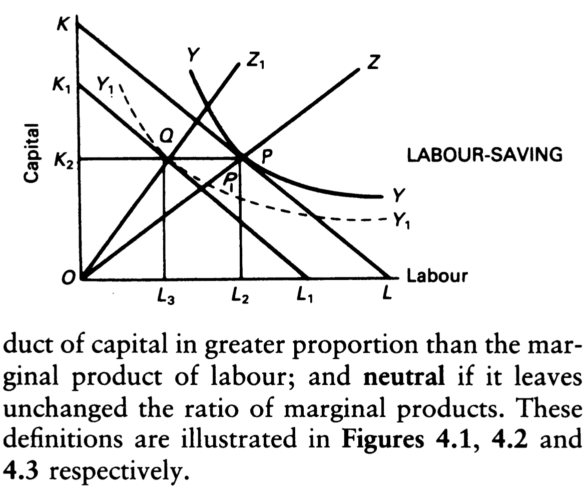


Figure 4.2

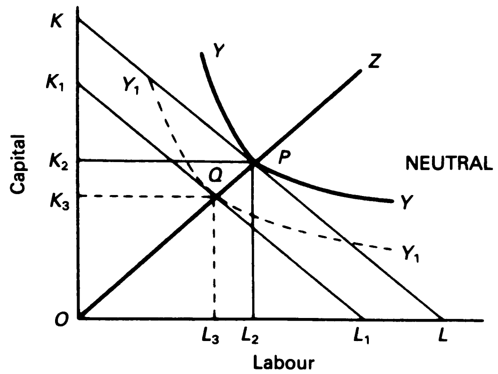


duct of capital in greater proportion than the marginal product of labour; and **neutral** if it leaves unchanged the ratio of marginal products. These definitions are illustrated in **Figures 4.1, 4.2** and **4.3** respectively.

It will be recalled from Chapter 2 that technical progress on a production-function map is represented by shifts in the function towards the origin showing that the same output can be produced with fewer inputs, or that the same volume of inputs can produce a greater output. According to the shape of the new production function, fewer of either one or both factors will be required to produce the same output. In the case of neutral technical progress some of both factors can be dispensed with. In the case of non-neutral technical progress, if only one factor is saved technical progress is said to be *absolutely* labour- or capital-saving. If fewer of both factors are required, technical progress is said to be *relatively* labour- or capital-saving.

Consider first **neutral technical progress** (**Figure 4.3**). The ray from the origin, or expansion path,

Figure 4.3



OZ, goes through the minimum-cost point of tangency between the production function *YY* and the factor–price ratio line *KL*. With neutral technical progress the production function shifts such that the new point of tangency at the same factor–price ratio lies on the same expansion path. This means that the ratio of marginal products is the same at the same capital to labour ratio, and equal proportionate amounts of the two factors are saved. The condition for neutral technical progress is simply that the new production function is parallel to the old.

With **labour-saving technical change** (**Figure 4.2**) the ratio of the marginal product of capital to the marginal product of labour rises such as to shift the minimum-cost point of tangency from the old expansion path *OZ* to a new expansion path OZ_1. At P_1, where the new production function cuts the old expansion path, the ratio of the marginal product of labour to capital is lower than at *P*. P_1 is not an equilibrium point and it will pay producers to move to point *Q*, substituting capital for labour. The ratio of marginal products has not remained unchanged at a constant labour to capital ratio, and L_2L_3 labour is saved. The isoquants have been so drawn as to keep the volume of capital the same, but this is purely incidental.

Capital-saving technical progress (**Figure 4.1**) may be described in exactly analogous fashion. In this case the ratio of the marginal product of labour to the marginal product of capital rises and the shift in the production function is such that the minimum-cost point of tangency now lies to the right of the old expansion path. At P_1, where the new production function cuts the old expansion path, the ratio of the marginal product of labour to capital is higher than at P. Again, P_1 is not an equilibrium point and it will pay producers to move to point Q, substituting labour for capital. The ratio of marginal products has not remained unchanged at a constant labour to capital ratio, and in this case K_2K_3 capital is saved.

As with Harrod technical progress, it is difficult to know what form Hicks technical progress takes in practice, largely because of identification problems. While the classification is analytically distinct, how does one distinguish empirically between a change in factor proportions due to a shift in the production function and a change in factor proportions due to a change in relative prices? Hicks himself seemed to be of the view that technical progress is relatively labour-saving, but the indirect evidence we have for this is slight. For example, given the magnitude of the rise in the price of labour relative to capital and an elasticity of substitution of close to unity, labour could not have maintained or increased its share of the national income (as it has done slightly in some advanced countries) if technical progress was markedly biased in the labour-saving direction. If technical progress is biased in one direction or another, its major impact will be on factor utilisation if the price of factors is not flexible. The type of technology employed, and the factor proportions it entails, must bear a major responsibility for the growing level of unemployment in developing countries, as described in Chapter 1. The case for the use of more labour-intensive techniques is discussed in Chapter 10.

How Societies Progress Technologically

Improvements in the art of production, which is the most literal interpretation of technical progress, result from a combination of **research, invention, development** and **innovation**. Research and invention are the activities which 'create' knowledge, and development and innovation are the activities which apply new knowledge to the task of production. These are all basically economic activities. But the study of the way in which societies progress technologically, and the speed of progress, is not only the preserve of the economist. The economist can identify the mainsprings of progress, but their pervasiveness and acceptance in societies is not a purely economic matter. The spread of new knowledge, for example, depends on its rate of adoption and diffusion and this raises questions of individual motivation, the willingness to assimilate new ideas and to break with custom and tradition, which impinge heavily on territory occupied by development sociologists. The relative importance of different factors contributing to progress, and the speed of progress itself, will vary from country to country according to its stage of development and a whole complex of social and economic forces. Moreover, many of the mainsprings of technological progress are not mutually exclusive. At the risk of excessive simplification, attention here will be confined to four main sources of progress which are of potential significance to any society.

One major source of improvement in technology, and progress, is the **inventive and innovative activity** of the native population. All societies are endowed to some degree with a potential supply of inventors, innovators and risk-takers and, in the absence of imported technology and personnel, it is on the emergence of this class of person that technological progress will primarily depend in the early stages of development. Economic backwardness in many countries may quite legitimately be traced back to a relative shortage of inventors, innovators and risk-takers. It is fairly well established that some cultures and some environments are more amenable to change than others, and in the past have produced a greater supply of entrepreneurs. The view is frequently expressed that the major source of growth during Britain's industrial revolution was primarily technological progress fostered by an abundant supply of inventors, innovators, entrepreneurs and risk-takers, with the accumulation of capital playing an essentially secondary role. Schumpeter ((1943) and (1934)) has laid great stress on the role of the entrepreneur and innovation in the development process. Ultimately, however, it is the lag between the creation of knowledge and its adoption, and the rate of dissemination of new knowledge, that most directly affects the rate of measured technical progress between countries; and these two facets of innovation are intimately connected with the attitudes of society at large. For Schumpeter, progress results from what he calls the 'process of creative destruction', which is bound up with innovation, and instigated by competition. Innovation, in turn, is the driving force behind competition. But innovation requires decision-takers and hence his complementary stress on the role of the entrepreneur. A characteristic of many poor countries is a shortage of decision-takers, a relative lack of competitive spirit and a general aversion to risk-taking. These may be partly cultural traits and also partly, if not mainly, a function of the stage of development itself. The characteristics commonly associated with business dynamism are themselves a function of business, and more particularly the form of organisation we call 'capitalism'. In a closed economy, it might be said that invention is a necessary but not a sufficient condition for progress. In an open economy, it is not even a necessary condition because technology embodying new knowledge can be imported from abroad, from societies more technically advanced. If backward economies lack inventors they can still innovate by applying appropriate technology developed abroad. Technical assistance programmes in developing countries, organised by the developed countries, are designed to foster innovation, particularly the adoption of new techniques and new goods. Societies' exposure to new goods may be a powerful factor in economic development by acting as an incentive to producers and workers to increase their surplus for exchange. The spread of technology and ideas may also be expected to come about naturally in the general process of commercial intercourse, and the exchange of information through trade. The speed with which modern technology is absorbed by economically backward countries will depend on the same class of factors as the diffusion of knowledge within countries – which in the final analysis amounts to the receptiveness of all sections of the community to change. The absorption of technology from abroad is referred to as the '**cultural diffusion process**', and again its study involves sociological analysis as well as economics.

■ Learning

A third means by which societies progress technologically, gradually raising their efficiency and productivity, is through the process of '**learning by doing**', which refers to the accumulation of experience by workers, managers and owners of capital in the course of production which enables productive efficiency to be improved in the future. It is a learning process that Adam Smith referred to in discussing the **division of labour**. Smith stressed the importance of the division of labour for three main reasons: first, as a means of improving the dexterity of workers; second, to save time which is lost in the absence of specialisation; and third, to encourage the invention of machines which facilitate and abridge labour to improve the productivity of labour. All these advantages of the division of labour are part of a learning process. Labour improves its skill through specialisation and work experience, and becomes more adept at the job in hand. Managers see deficiencies in organisation, which can subsequently be remedied; and on the basis of accumulated knowledge they are also able to embody more productive techniques in the capital stock.

Learning may be regarded as either endogenous or exogenous, or both, depending on the factor of production considered. If existing labour and existing capital are subject to a learning process, then learning by doing can be regarded as exogenous and as part of disembodied technical progress. If, however, it is assumed that learning enters the productive system only through the addition of new factors, then learning by doing must be regarded as endogenous. This is the basis of Arrow's capital model (1962), from which the term 'learning by doing' originates. His hypothesis with respect to capital is that at any moment of time new capital goods incorporate all the knowledge then available based on accumulated experience, but once built their productive efficiencies cannot be altered by subsequent learning.

The endogenous model may be more appropriate in the case of capital but is much less relevant in the case of labour. It is in relation to labour that most research into the learning process has been conducted. The notion of the **learning curve**, or progress function, which has been found in many industries, relates direct *labour* input per unit of output to cumulative output as the measure of experience. Typically, labour input per unit of output is found to decline by between 10 and 20 per cent for each doubling of cumulative output, with a corresponding rise in the productivity of labour. For any one product, of course, learning cannot go on at the same rate for ever, but since product types are constantly changing it is probably safe to conclude that in the aggregate there is no limit to the learning process. For economies as a whole the residual factor in the growth equation must partly reflect the process of learning by doing. There is no easy way of adjusting the labour-input series for learning to include it as part of the contribution of labour to growth.

■ Education

Finally, we come to the relation between technological progress and improvements in the health, education and skills of the labour-force, or what is commonly called **investment in human capital**. Investment in human capital takes many different forms, including expenditure on health facilities, on-the-job and institutional training and re-training, formally organised education, study programmes and adult education, etc. Investment in human capital can overcome many of the characteristics of the labour force that act as impediments to greater productivity, such as poor health, illiteracy, unreceptiveness to new knowledge, fear of change, a lack of incentive and immobility. Improvements in the health, education and skill of labour can increase considerably the productivity and earnings of labour and may be preconditions for the introduction of more sophisticated, advanced technology applied to production. The capacity to absorb physical capital may be limited, among other things, by investment in human capital. It is in this respect that there is likely to be a close interrelationship between the mainsprings of technological progress.

Detailed empirical work on the relation between education and growth relates largely to advanced countries. We gave some of the results of such studies in Chapter 2. We can now elaborate in a little more detail. Professor Schultz, in his Presidential Address to the American Economic Association in 1961 (see Schultz (1961)), was one of the first to suggest that growth in the United States 'unexplained' by conventional factor inputs might be due to the rapid increase in the quality of labour through education. Similarly, it may be the increase in education in the twentieth century that accounts for the substantial rise in earnings per worker. According to Schultz the stock of education in the United States rose by approximately 850 per cent between 1900 and 1956 compared with an increase in reproducible capital of 450 per cent (at constant 1956 prices). Schultz acknowledged the difficulties in estimating the rate of return to education, but argued that even when every conceivable cost is considered, and all expenditure is treated as investment and none as consumption,[1] the return to investment in education is at least as high as, if not higher than, the return on non-human capital. Becker's lower estimate (Becker (1964)) of the social return on male college graduates in the United States, excluding 'spillovers', is 12.5 per cent, which is the same as Blaug's estimate for Britain for the last three years of secondary schooling (Blaug (1965)). Taking 60 per cent as the measure of 'unexplained' growth between 1929 and 1956, Schultz concluded that between 30 and 50 per cent of this residual can be taken as representing a return to the increased education of the labour force. Bowman (1964) reaches similar conclusions. Using Schultz's data on the stock of education, and applying rates of return of 9, 11 and 17.3 per cent, Bowman has calculated corresponding percentage contributions of the growth of education to national income of 21, 26 and 40 per cent respectively. Denison (1962) also reaches roughly the same conclusion, using a more direct approach which has now become fairly standard for estimating the contribution of education to growth. The method involves two steps. The first involves gathering information on the distribution of the labour force by amounts of schooling at different dates. The second step involves collecting information on income differences between education cohorts with different amounts of schooling embodied in them, which are then used as weights to derive an index of the improvement in the quality of labour due to education on the assumption that a certain percentage of differences in earnings is due to differences in the amount of education. Suppose, for instance, that the earnings differential between those with eight years' schooling and those with ten years' schooling is 20 per cent, that one-half of the difference is assumed to be due to the extra two years' schooling, and that a person with eight years' schooling is treated as one unit; then the person with ten years' education is counted as 1 + (0.5 × 0.2) = 1.1 units. On this basis, but assuming that 60 per cent of income differences are due to education, Denison estimates that the expansion of education in the United States over the period 1929–57 raised the quality of labour by the quantity equivalent of 29.6 per cent or 0.93 per cent per annum. Taking the annual growth rate of output of 2.93 per cent and assuming an elasticity of output with respect to labour of 0.73, this gives a contribution of education to measured growth of 23 per cent (i.e. (0.73 × 0.93)/2.93 = 0.23). The effect of education on the growth of *per capita* income is even more striking. Denison gives the contribution as 42 per cent, and Schultz puts the contribution at between 25 and 45 per cent for the same period. These results are very impressive, and furthermore there are good reasons why the calculations may be underestimates. For one thing the methodology employed ignores the role of education in maintaining the average quality of the labour force; second, no allowance is made for improvements in the quality of education; and third, there are all the 'spillovers' from education to consider, such as the contribution of education to knowledge and its diffusion throughout society. Becker wants to attribute the whole of Denison's residual to these 'spillovers' and to double his own estimate of the social rate of return to college education as a result.

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[1] The greater the proportion of expenditure treated as pure consumption, the higher the rate of return on the investment component.

An alternative procedure for estimating the contribution of education to growth, and the rate of return on education expenditure, is to use the production-function approach outlined in Chapter 2. All that is required is a measure of education expansion ('education deepening' following Denison) to be included in the production function. The contribution of education to measured growth is then the rate of growth of the education variable multiplied by the elasticity of output with respect to the education variable. In estimating form, the production function with the growth of education included would be written:

$$r_O = r_T + \alpha r_K + \beta r_L + \gamma r_E \tag{4.1}$$

where r_E is the rate of growth of education, and γ is the elasticity of output with respect to education. The rate of return to education would then be measured as:

$$\frac{\Delta O}{\Delta E} = \gamma \frac{\bar{O}}{\bar{E}} \tag{4.2}$$

where $\bar{O}$ and $\bar{E}$ are the mean levels of output and the education variable, respectively.

It is the apparent importance of education in the growth process in developed countries that has invoked the response that investment in human capital may be as important as investment in physical capital in developing countries. Assuming the analyses of developed countries to be sound, the question is whether it is legitimate to draw policy conclusions for developing countries from the experience of developed countries. Can predominantly Western experience be used to forecast the returns to education in the poorer nations of the world? The potential dangers of doing so

Table 4.1 ***Rates of Return to Education***

		Social return (%)			*Private return (%)*		
		Primary	*Secondary*	*Tertiary*	*Primary*	*Secondary*	*Tertiary*
Developing countries							
Brazil	(1970)	—	24	13	—	25	14
Chile	(1959)	24	17	12	—	—	—
Colombia	(1973)	—	—	—	15	15	21
Ethiopia	(1972)	20	19	10	35	23	27
Ghana	(1967)	18	13	17	25	17	37
Kenya	(1971)	22	19	9	28	33	31
India	(1978)	29	14	11	33	20	13
Indonesia	(1978)	22	16	15	26	16	—
Pakistan	(1975)	13	9	8	21	11	27
South Korea	(1971)	—	15	9	—	16	16
Developed countries							
Japan	(1976)	10	9	7	13	10	9
United Kingdom	(1978)	—	9	7	—	11	23
United States	(1969)	—	11	11	—	19	15

Source: G. Psacharopoulos, 'Returns to Education: A Further International Update and Implications', *Journal of Human Resources*, April 1985.

have been forcefully set out by Balogh and Streeten (1963). How convenient, they say, to elevate a statistical residual to the engine of development and by doing so convert ignorance into 'knowledge'! On the other hand, a recent World Bank survey concludes that 'studies have shown that economic returns on investment in education seem, in most instances, to exceed returns on alternative kinds of investment, and that developing countries obtain higher returns than the developed ones' (World Bank, *Education Sector Policy Paper* (1980)). Some estimates of the rate of return to education in developing countries compared with developed countries are given in **Table 4.1**, distinguishing between the return to the individual (the private return) and the return to the economy at large (the social return).

It will be noticed from the summary table that, in general, both the private and the social return to education is higher in developing countries than in the three developed countries. Two other interesting observations can also be made. Firstly the private return is invariably higher than the social return because many of the costs of education are not borne by the private individual and the extra return to society does not compensate. Secondly, the social return declines the higher the level of education. The returns to primary education are very high, while the returns to tertiary (higher) education are quite low.

In considering investment, and rates of return, in education, what needs to be remembered is that education is not a homogenous commodity. The returns to different types of education may differ radically between backward and advanced countries owing to differences in supply (cost) and demand conditions. A high return to training in physics in America, say, does not imply the same high return in Zambia. The returns to different types of education and training for different age groups and types of institution must be worked out in individual countries before policy conclusions are reached. Education for education's sake, except perhaps at the primary level, would inexcusable resource waste. The greatest need is to decide on the type of educated manpower required and to plan accordingly with the aid of manpower budgets. In this way skill bottlenecks can be eased and unemployment among the educated avoided. An unemployed intelligentsia, which is already a reality in some poor countries, is not only an avoidable waste but may also undermine the development process.

One of the strongest associations in developing countries is between levels of *per capita* income and the proportion of the population in primary education, and the evidence is that educational expansion at the elementary level has led growth. Sustained growth seems to be more strongly associated with the proportion of children enrolled in primary schools than any other factor connected with human capital. Lewis (1966, p. 109) has remarked that 'allowing for some absorption into farming and for the expansion of non-agricultural employment, a developing economy needs to have at least 50 per cent of its children in primary schools'. The hypothesis is that traditional customs and attitudes cannot be changed significantly until a large section of the community at a fairly young age is exposed to new ideas and ways of doing things. The relevance of primary education in this regard may partly explain why traditional agriculture has been transformed in some countries but not in others. The percentage of the age group enrolled in primary and secondary education in developing countries is given in **Table 1.8** (p. 46). A survey of 17 developing countries by Psacharopoulos (1973) found an average rate of return of 25 per cent to expenditure on primary education.

The fact that the capacity of a country to absorb physical capital and technological progress may be constrained by the availability of human capital, however, is not a sufficient reason for giving it preferential treatment. As a general rule, both types of capital formation need to be considered together in the planning process and carried on simultaneously. Ultimately, the amount of resources devoted to investment in human capital is an allocative problem that each country must solve itself, on which no hard-and-fast rules can be laid down *a priori*. All that can be done in general is to point to the *potential* benefits of education, and investment in human beings in the widest sense.

Questions for Discussion and Review

1. What is meant by the process of capital accumulation?
2. Distinguish between the various forms of investment and capital accumulation that can raise income per head.
3. Why do developing countries, and many development economists, lay great stress on the role of capital accumulation in the development process?
4. Define the concept of the incremental capital–output ratio. What is the use of the concept in development planning?
5. How will technical progress affect the capital–output ratio?
6. What is meant by the terms: neutral, capital-saving, and labour-saving technical progress?
7. What are the main means by which societies progress technologically?
8. In what sense does expenditure on education represent an addition to the capital stock?
9. What is 'learning by doing'?
10. Why did Rostow define 'take-off into sustained growth' in terms of a critical ratio of investment to national income? (See also Chapter 1.)

Part III
Obstacles to Development

■ Chapter 5 ■

Dualism, Centre–Periphery Models and the Process of Cumulative Causation

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It is easy to argue that poverty and backwardness are due to a general shortage and inefficient use of the key factors of production; it is much harder to determine precisely why there should be a dearth of some factors and an abundance of others, and why development may be a slow and lengthy process. It is certainly impossible to explain present-day international discrepancies in the level of development with reference to *initial* differences in factor endowments. The present development gap has arisen largely through industrial development in certain selected areas of the world which has, in turn, generated its own factor endowments. The purpose here, however, is not to consider why some countries were able to industrialise sooner than others, but rather to consider some of the potential obstacles to growth in the present developing countries, and the mechanisms through which unequal advantage between developed and developing countries is perpetuated.

First, the **dualistic structure** of developing countries will be considered. Secondly we shall examine Myrdal's model of the process of **circular and cumulative causation** which can be applied to regions and countries alike (Myrdal (1957)). We shall see that Myrdal's model is one of many that can be used to understand the perpetuation of the development gap and divergencies between North and South or between the 'centre' (industrialised) countries and the 'periphery' (primary producing) countries. The models of Prebisch and Seers will be examined in this context, and their similarities emphasised. Finally we shall briefly discuss models of **unequal exchange** and **dependency** which emphasise alternative mechanisms making for international inequality in the world economy. In the next chapter in this section we shall elaborate on the so-called population 'problem' in developing countries.

■ Dualism

Dualism is a description of a condition in which developing countries may find themselves in the early stages of development, the extent of which may have implications for the future pattern and pace of development. There are a number of possible definitions and interpretations of the term 'dualism', but in the main it refers to economic and social divisions in an economy, such as differences in the level of technology between sectors or regions, differences in the degree of geographic development and differences in social customs and attitudes between an indigenous and an imported social system. Dualism in all its aspects is a concomitant of the growth of a money economy which, as we saw in Chapter 3, may either arise naturally as a result of specialisation or be imposed from outside by the importation of an alien economic system – typically capitalism. Basically, therefore, a dual economy is one characterised by a difference in social customs between the subsistence and exchange sectors of an economy, by a gap in the level of technology between the rural subsistence sector and the industrial monetised sector, and possibly by a gap in the level of *per capita* income between regions of a country if the money economy and industrial development are geographically concentrated. In fact, it is not unusual for **geographic, social and technological dualism** to occur together, with each type of dualism tending to reinforce the other. Also, the more 'progressive' sectors typically have favourable access to scarce factors of production, which is a major cause of the persistence of dualism. **Urban bias** plays an important part in this process (Lipton (1977)).

If the basic origin of dualism is the introduction of money into a subsistence barter economy, and development depends on the extension of the money economy, development must contend with the existence of dualism in all its aspects. We shall consider here social and technological dualism, leaving geographic dualism until later when we consider Myrdal's hypothesis of cumulative causation.

The first question is, what development problems does the existence of dualism pose for an economy, and how can dualism impede and retard development? As far as **social dualism** is concerned, the obstacles appear to be similar to those presented by a traditional society with no modern exchange sector at all. The task is one of providing incentives in the subsistence sector and drawing the subsistence sector into the money economy. The fact that the indigenous subsistence sector may be reluctant to alter its traditional way of life and to respond to incentives is not peculiar to a dual economy. It is true, therefore, that underdevelopment tends to be associated with social dualism, but it is perhaps a little misleading to regard social dualism as an underlying *cause* of backwardness and poverty. It would be difficult to argue that development would be more rapid in the absence of a monetary sector, from which the existence of dualism stems. Even if the growth of the exchange sector makes little impact on attitudes in the indigenous sector, it is bound to make some contribution to development by employing labour from the subsistence sector and disseminating knowledge. Without the growth of the money economy it is difficult to envisage much progress at all. In short, it seems more realistic to regard social dualism as an inevitable consequence of development rather than as a basic cause of underdevelopment.

This is not to say that social dualism does not create problems of its own. For example, different development strategies will be required to cope with dissimilar conditions in the two sectors, and this may involve real resource costs not encountered by the developed economy. It is in this sense that the dual economy is at a comparative disadvantage.

Similar reservations can be raised over whether it is accurate to describe **technological dualism** as a cause of underdevelopment. As with social dualism, it is probably more realistic to regard it as an inevitable feature of the development process. Again, though, the difficulties that may ensue from gaps in technology between the rural and industrial sectors of the economy must be recognised. Two disadvantages are commonly associated with technological dualism. The first we mentioned earlier: where technological dualism is the result of a foreign enclave, a proportion of the profits generated in the industrial sector will be remitted to the home country, reducing the level of saving and investment below what it might have been. The second disadvantage is more fundamental, but difficult to avoid. If in the rural, or non-monetised, sector of the economy production processes are characterised by labour-intensive techniques and variable technical coefficients of production, while production processes in the industrial, technologically advanced sector are capital-intensive and possess relatively fixed technical coefficients, it is possible that the technology of the industrial sector may impede progress in the agricultural sector on which the rapid development of the total economy, in part, depends. First, relatively fixed technical coefficients (i.e. a low elasticity of substitution between factors) means that labour can only be absorbed from agriculture into industry as fast as the growth of capital, and second, capital intensity itself will restrict employment opportunities in the industrial sector, contributing to urban unemployment and perpetuating underdevelopment in the rural sector. Hence, productivity growth in the agricultural sector, which is recognised as being necessary to establish a secure basis for take-off into sustained growth, may be slowed down.

It is true that if the technology of the modern sector (imported or otherwise) does embody fixed technological coefficients, it may be difficult for an economy to use the socially optimum combination of factors, but this short-run disadvantage must be weighed against the favourable repercussions on productivity stemming from the advanced technology. If capital accumulation and technical progress, and the development of an industrial sector – in addition to agricultural development – are essential prerequisites to raising the level of *per capita* income, it is difficult to see how technological dualism can be avoided, at least in the early stages of development. The best that can be done is first to encourage the widespread application and rapid assimilation of technical progress throughout all sectors of the economy, and second to ensure the 'proper' pricing of factors of production to prevent in the first place the introduction of a technology which may be profitable to private individuals but which does not maximise the returns to society at large because factor prices do not adequately reflect relative factor endowments. But even a technology which is socially optimal in this sense may not be the technology which provides the soundest basis for sustained growth in the long run. The question of the choice of techniques is discussed in detail in Chapter 10.

The Process of Cumulative Causation

The hypothesis of cumulative causation as an explanation of the backwardness of developing nations is associated with the name of Gunnar Myrdal (Myrdal (1957)). Basically, it is a hypothesis of **geographic dualism**, applicable to nations and regions within nations, which can be advanced to account for the persistence of spatial differences in a wide variety of development indices including *per capita* income, rates of growth of industrialisation and trade, employment growth rates and levels of unemployment. As such, the process of cumulative causation is a direct challenge to static equilibrium theory, which predicts that the working of economic forces will cause spatial differences to narrow. Myrdal contends that in the context of development both economic and social forces produce tendencies towards disequilibrium, and that the assumption in economic theory that disequilibrium situations tend towards equilibrium is false. If this were not so, how could the tendency for international differences in living standards to widen be explained? Thus Myrdal replaces the assumption of stable equilibrium with what he calls the hypothesis of **circular and cumulative causation**, arguing that the use of this hypothesis can go a long way towards explaining why international differences in levels of development, and interregional differences in development within nations, may persist and even widen over time.

He first considers the hypothesis in the context of a geographically dual economy, describing how, through the media of labour migration, capital movements and trade, the existence of dualism not only retards the development of the backward regions but can also slow up the development of the whole economy. To describe the process of circular and cumulative causation, let us start off with a country in which all regions have attained the same stage of development as measured by the same level of *per capita* income, or by similar levels of productivity and wages in the same occupations. Then assume that an exogenous shock produces a disequilibrium situation with development proceeding more rapidly in one region than another. The proposition is that economic and social forces will tend to strengthen the disequilibrium situation by leading to cumulative expansion in the favoured region at the expense of other regions, which then become comparatively worse off, retarding their future development. This contrasts with neoclassical equilibrium theory which assumes that, through the process of factor mobility, wage rates and the rate of profit will equalise across regions. According to neoclassical theory, where labour is scarce and capital is abundant, labour will flow in and capital will flow out thus reducing wages and raising the rate of profit, while in less prosperous areas where labour is abundant, labour will flow out and capital will flow in, raising wages and reducing the rate of profit. By contrast, what Myrdal has in mind is a type of multiplier-accelerator mechanism producing increasing returns in the favoured region. Instead of leading to equality, the forces of supply and demand interact with each other to produce cumulative movements away from spatial equilibrium. Since the wage level is the basic determinant of *per capita* income, let us take the example of wages and wage differences to illustrate the kind of process that Myrdal has in mind. Take two regions, A and B (e.g. north and south Italy), and assume that wages are determined by supply and demand, as in **Figures 5.1** and **5.2**.

Figure 5.1

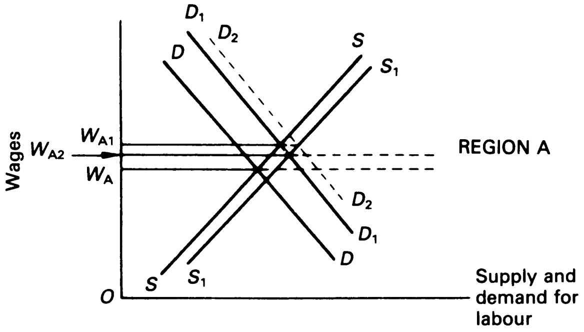
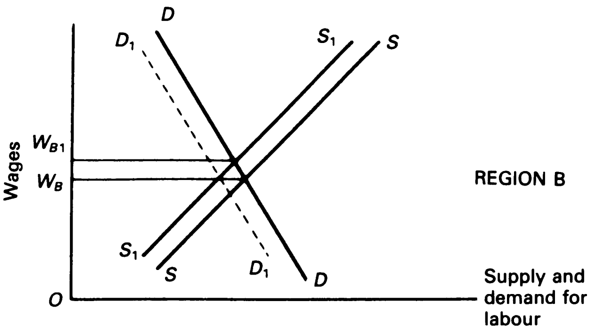


Figure 5.2



Suppose to start with that wage levels are identical in the two regions, $W_A = W_B$. Then assume that a stimulus of some sort causes the demand for labour, and therefore wages, to rise in region A relative to region B; that is, the demand curve for labour in region A shifts to D_1D_1, causing wages to rise to OW_{A1}. Since labour tends to respond to differences in economic opportunities of this sort, the wage discrepancy may be assumed to induce labour migration from region B to region A. Equilibrium theory then predicts that there will be a tendency for wage levels to be equalised once more through a *reduction* in labour supply in region B from SS to S_1S_1 and an *increase* in labour supply in region A from SS to S_1S_1, giving a wage in region A of W_{A2} equal to a wage in B of W_{B1}. According to the hypothesis of cumulative causation, however, changes in supply may be expected to react on demand in such a way as to counteract the tendency towards equilibrium. Migration from region B denudes the area of human capital and entrepreneurs, and depresses the demand for goods and services and factors of production, while movements into region A, on the other hand, will tend to stimulate enterprise and the demand for products, adding to the demand for factors of production. In short, migration from region B will cause the demand curve for labour to shift to the left, say to D_1D_1, and migration into region A will cause the demand curve for labour to shift further to the right, say to D_2D_2, causing the initial wage discrepancy at least to persist, if not widen (if the shifts in demand are greater than those assumed). Thus once development differences appear, there is set in motion a chain of cumulative expansion in the favoured region which has what Myrdal calls **'backwash' effects** on other regions, causing development differences in general to persist or even diverge.

Capital movements and trade also play a part in the process of cumulative causation. In a free market, capital, like labour, will tend to move to where the prospective return is highest and this will be to the region where demand is buoyant. Capital, labour and enterpreneurship will tend to migrate together. The benefits of trade will also accrue to the host region. Regions within a nation using a common currency cannot have balance-of-payments difficulties in the normal sense, but the maintenance of employment depends on the ability to export, otherwise unemployment will appear. If production is subject to increasing returns, the region experiencing the rapid growth of factor supplies will be able to increase its competitive advantage over the relatively lagging regions containing smaller-scale industries, and increase its real income accordingly. In the same way, the general freeing and widening of international markets and the expansion of world trade will tend to favour the more rapidly growing regions within nation-states.

The impact of immigration into the expanding region is also likely to induce improvements in transport and communications, education and health facilities, etc., improving efficiency and productivity and widening still further the competitive advantage of the growing region over the lagging regions experiencing out-migration of the factors of production.

Such is the potential strength of the 'backwash' effects of the process of circular and cumulative causation, that Professor Hirschman (1958) has suggested that the lagging regions may possibly be better off if they became sovereign political states. If a lagging area was an independent 'country', the mobility of factors of production could be more easily controlled, competition between the leading and lagging regions could be lessened, each region could more easily concentrate on producing goods in which it possessed the comparative cost advantage, separate exchange rates could be fixed for the two regions, and resort could be more easily made to protection.

Despite these potential advantages of nationhood for a backward region, however, Hirschman argues against sovereignty because he believes that the forces making for the interregional transmission of growth are likely to be more powerful than those making for 'international' transmission. This presupposes, however, that the forces making for the interregional transmission of growth are lost, and begs the question of whether the differential advantages of being a region within a nation, as distinct from a separate 'nation', offset the 'backwash' effects that still remain. Hirschman recognises the continued existence of 'backwash' effects and argues that, to offset them, a nation which is concerned with developing its backward regions should provide certain equivalents of sovereignty, such as a separate tax system and the right to protect certain activities. Policies must be designed to reduce what he calls the **'polarisation' effects** of interregional differences in development and to strengthen the **'trickling down' effects**. The 'trickling down' effects are the favourable repercussions on backward regions emanating from expanding regions, which Myrdal calls **'spread' effects**. These 'trickling down' or 'spread' effects consist mainly of an increased demand for the backward areas' products and the diffusion of technology and knowledge. In Myrdal's view, the 'spread' effects are weaker than the 'backwash' effects, and if interregional differences are to be narrowed, nations must rely on state intervention. The alternative is to wait for a natural end to the process of cumulative causation, which may be a long time coming.

But a time must eventually come when increasing costs in the expanding region will halt expansion. The higher costs of living, and the external diseconomies produced by congestion, will ultimately outweigh the benefits of greater efficiency and higher money returns to the factors of production. The process of migration will then be halted, and possibly reversed. In some developed countries this stage is now beginning to be reached. The question for governments with certain growth and welfare objectives is whether they can afford to let the process take its natural course, and to tolerate the inequalities that may arise before the process ends. In practice, governments in many advanced countries have taken active steps for many years to redress regional imbalances, and this is one reason why regional disparities tend to be less in advanced countries than in developing countries. In the developing countries, however, Myrdal is of the view that, far from lessening regional inequalities, the state has been a positive force making for their persistence: 'In many of the poorer countries the natural drift towards inequalities has been supported and magnified by built-in feudal and other inegalitarian institutions and power structures which aid the rich in exploiting the poor' (Myrdal (1963 edn), p. 40).

■ Regional Inequalities

The evidence collected by Williamson (1965) shows fairly conclusively that regional disparities in *per capita* income tend to widen in the early stages of the development process and then narrow. Williamson examines three types of evidence: the international cross-section data, short and long run time-series data for individual countries, and cross-section data for the United States, treating the individual States as 'countries' and the counties within the States as regions. The measure of regional inequality taken is the coefficient of variation of regional *per capita* income, with each region's observation weighted by its relative share of the total population. As far as the international cross-section evidence is concerned, a sample of 24 developed and developing countries in the 1950s gives the lowest weighted coefficient of variation for the richest group of countries consisting of Australia, New Zealand, Canada, the United Kingdom, the United States and Sweden, and the highest coefficient of variation for a group of countries undergoing rapid structural change including Brazil, Italy, Spain, Colombia and Greece. India shows a much lower coefficient of variation, suggesting that very poor countries tend to be uniformly poor. The short run time-series evidence for sixteen countries showed the coefficient of variation to be stable or falling in all the developed countries, and increasing in the developing countries of Japan, Yugoslavia and India (but not Brazil). The longer historical time-series evidence shows that the experience of regional inequality in the United States, Italy, Brazil, Sweden and France seems to follow the inverted 'U' shape of initially increased inequality followed by a decrease in inequality. Finally, the US cross-section evidence in 1950 and 1960 shows that regional *per capita* income variations within individual States decline significantly with the level of State *per capita* income.

The pattern found is not hard to explain. Differences must first emerge as a result of some 'shock' or stimulus in one region or set of regions. Historically, in an international context, the initial shock was the industrial revolution in Western Europe, which gave Europe an initial advantage in the production and trade of industrial commodities. Once a difference has emerged, it will tend to be perpetuated by the processes already described. Migration from poor to rich regions will tend to be selective in the early stages of development because only those with skills and education will be able to afford to migrate. 'Spread' effects emanating from prosperous regions will be weak owing to a general lack of political and economic integration. The factors which accentuate differences in the early stages of development will tend to weaken with time, however. Migration will become less selective; 'spread' effects will become more powerful; external diseconomies of expansion and congestion in expanding regions will grow, curbing capital migration from poor to rich regions; and then governments may attempt to rectify imbalance.

Williamson finds regional differences in *per capita* income partly a function of differences in work-force participation rates, and partly a function of regional differences in productivity due to differences in the industrial mix. Regional dualism in the industrial sector alone is not found to be very marked. The major difference lies in productivity differences between industry and agriculture. Since the biggest geographical income differences are likely to be between urban and rural areas, and since development is associated with the spread of urbanisation and a reduction in the size of the rural sector, again it is not surprising that regional disparities should narrow somewhat in the later stages of development.

International Inequality and Centre–Periphery Models

The process of circular and cumulative causation is also used by Myrdal in an attempt to explain widening international differences in the level of development from similar initial conditions. Through the means of labour migration, capital movements and trade, international inequalities are perpetuated in exactly the same way as regional inequalities within nations. Myrdal argues that through trade the developing countries have been forced into the production of goods, notably primary products, with inelastic demand with respect to both price and income. This has put the developing countries at a grave disadvantage compared with the developed countries with respect to the balance-of-payments and the availability of foreign exchange. Moreover, with the tendency for the efficiency wage (i.e. the money wage in relation to productivity) to fall in faster-growing areas relative to other areas, the developed countries have gained a cumulative competitive trading advantage, especially in manufactured commodities. Myrdal, of course, is not alone in this view, and we shall elaborate below on other models which stress the unequal gains and the balance-of-payments effects of trade as the main media through which international differences in development are perpetuated.

Myrdal argues in the same vein in the case of capital movements. If it were not for exchange controls and generous incentives for indigenous and foreign capitalists to earn high profits, the natural tendency would be for the developing countries to be net exporters of capital. Risks associated with investment tend to be much higher in developing countries, and safety is as much a factor determining capital movements as rates of return. As it happens, owing to the favourable tax treatment of profits, market guarantees, and the large volume of capital from international lending organisations, the developing countries are generally net importers of long term capital, although the short-term account tends to be adverse.

The potential weakness of Myrdal's hypothesis at the international level concerns the effects of labour migration. The international migration of labour from developing to developed countries can have beneficial as well as harmful effects on backward economies. The greatest deleterious effect on backward economies is the obvious one of possible loss of human capital, although even here, if the human capital is unemployed, migration may not be a disastrous loss. But it is not only the skilled and educated that may be induced to leave their native lands. Unskilled labour may also respond to the existence of better employment opportunities elsewhere. If it is argued that developing countries suffer from underemployment, and that productivity is low owing to 'overpopulation', the out-migration of unskilled labour could be a substantial benefit to developing countries. It is possible, for example, that emigration has helped to raise *per capita* income in some of the poorer European countries such as Greece, Turkey and Spain, and improved the balance of payments at the same time through remittances by emigrants to their home countries. In this important respect, generous immigration policies in advanced countries can provide a valuable means of development assistance. In the event of unrestricted emigration from the developing countries, and unrestricted immigration into the developed countries, it is difficult to know where the balance of advantage lies for the developing countries. In a world which restricts the immigration of unskilled labour, however, but permits the immigration of skilled labour, the developing countries undoubtedly suffer. While in theory, therefore, certain types of international labour migration could help to narrow international differences in levels of development, in practice the assumptions of such a model are rarely fulfilled.

Even so, any potential gain from unrestricted labour mobility is unlikely to offset the international 'backwash' effects arising from trade and international capital movements. Even with unrestricted migration, therefore, there would still be a tendency for international differences in the level of development to widen through trade and the free movement of capital. And the existence of international 'spread' effects gives no cause for modifying this conclusion. International 'spread' effects are fairly weak – certainly weaker than 'spread' effects within nations.

What, then, should be our verdict on the hypothesis of cumulative causation? Given that the hypothesis assumes free trade and free mobility of the factors of production, it perhaps contains more force with respect to interregional differences in development than international differences. On the other hand, it cannot be dismissed lightly in discussing the development gap. In view of the fact that there has been no tendency in the recent past for international *per capita* income levels to converge, the hypothesis is not refuted by the evidence. In particular, the present international trading and payments position of developing countries does not inspire confidence that the total gains from trade between the developed and developing countries are distributed equitably.

The contribution of the hypothesis of cumulative causation to an understanding of development and underdevelopment is its emphasis on development as a cumulative phenomenon and, more important still, its challenge to static equilibrium theory, i.e. that regions or nations which gain an initial advantage may maintain that advantage in perpetuity to the detriment of development elsewhere. At its root is the phenomenon of increasing returns defined broadly as the accumulation of productive advantages of the type discussed in Chapter 2, relating to how societies progress technologically.

Models of 'Regional' Growth-Rate Differences: Prebisch, Seers and Kaldor

While the Myrdal model of centre and periphery emphasises the process of cumulative causation working through increasing returns and competitiveness in favoured regions, other centre–periphery models stress the balance of payments implications of the particular pattern of production and trade between rich and poor countries which arise from the fact that industrial goods produced and traded by rich countries have a higher income elasticity of demand than goods produced and traded by poor countries. One of the earliest models, powerful in its simplicity, is that of Prebisch.

The Prebisch Model[1]

Consider a two-country, two-commodity model in which the advanced centre produces and exports manufactured goods with an **income elasticity of demand**[2] greater than unity, and the backward periphery produces and exports primary commodities with an income elasticity of demand less than unity. Let us suppose that the income elasticity of demand for manufactures (e_m) is 1.3, and the income elasticity of demand for primary commodities (e_p) is 0.8. Assume to start with that the growth rates of income of both centre and periphery are equal to 3 per cent, i.e. $g_c = g_p = 3.0$. What will be the growth of exports (x) and imports (m) in the centre and periphery? For the centre we have:

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[1] First hinted at in *The Economic Development of Latin America and its Principal Problems* (1950), and developed in 'Commercial Policy in the Underdeveloped Countries', *American Economic Review, Papers and Proceedings*, May 1959.

[2] The income elasticity of demand for goods measures the proportionate change in demand for a good with respect to a proportionate change in income, holding other things constant.

$$x_c = g_p \times e_m = 3.0 \times 1.3 = 3.9 \text{ per cent}$$
$$m_c = g_c \times e_p = 3.0 \times 0.8 = 2.4 \text{ per cent}$$

For the periphery we have:

$$x_p = g_c \times e_p = 3.0 \times 0.8 = 2.4$$
$$m_p = g_p \times e_m = 3.0 \times 1.3 = 3.9$$

With imports growing faster than exports in the periphery, this is not a sustainable position, unless the periphery can finance an ever-growing balance-of-payments deficit on current account by capital inflows. If it cannot, and balance-of-payments equilibrium on current account is a requirement, there must be some adjustment to raise the rate of growth of exports or to reduce the rate of growth of imports. Now suppose we rule out the possibility that relative prices measured in a common currency can change as an adjustment mechanism, the only adjustment mechanism left (barring protection) is a reduction in the periphery's growth rate to reduce the rate of growth of imports in line with the rate of growth of exports. From the model, we can solve for the growth rate of the periphery that will keep trade balanced. On the assumptions outlined, we must have $m_p = x_p$ or $g_p e_m = x_p$ and therefore

$$g_p = \frac{x_p}{e_m} = \frac{2.4}{1.3} = 1.846$$

Thus the growth rate of the periphery is constrained to 1.846 per cent, compared to 3 per cent in the centre. In these circumstances both the relative and absolute gap in income between periphery and centre will widen. Notice, in fact, that since the growth of the periphery's exports is equal to $g_c \times e_p$, we can write the above equation as:

$$g_p = \frac{g_c \times e_p}{e_m}$$

and dividing through by g_c, we reach the interesting result that the relative growth rates of the periphery and centre will equal the ratio of the income elasticity of demand for the two countries' commodities:

$$\frac{g_p}{g_c} = \frac{e_p}{e_m}$$

This result will hold as long as current account equilibrium on the balance-of-payments is a requirement, and relative price adjustment in international trade is either ruled out as an adjustment mechanism to rectify balance-of-payments disequilibrium or does not work. To avoid the consequences of this model, Prebisch argued the case for protection which in effect is a policy to reduce e_m, which for the periphery is the propensity to import manufactured goods. We reserve discussion of the relative merits of protection until Chapter 15 on trade policy.

■ The Seers Model[1]

A similar model of centre–periphery divergence, in which the crucial source of differences in growth rates and relative income levels is differences in the income elasticity of demand for manufactures and primary commodities, has been developed by Seers. As in the Prebisch model, relative prices between centre and periphery remain unchanged and it is assumed that trade must be balanced. Let the import functions of the centre and periphery be:

$$M_c = A + BY_c \tag{5.1}$$
$$M_p = a + bY_p \tag{5.2}$$

where Y stands for the level of income and *B* and *b* are the marginal propensities to import in the centre and periphery, respectively. Balanced trade requires that:

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[1] D. Seers, 'A Model of Comparative Rates of Growth of the World Economy', *Economic Journal* March (1962).

$$a + bY_p = A + BY_c \tag{5.3}$$

or

$$\frac{Y_p}{Y_c} = \frac{A - a}{bY_c} + \frac{B}{b} \tag{5.4}$$

Now what will happen to this relative difference in income between periphery and centre through time? Assume that income in the centre grows exponentially through time at some rate, *r*, so that we can write $Y_{ct} = Y_{co}e^{rt}$, where Y_{co} is the base level of income. We can then rewrite (5.4) with time subscripts as:

$$\frac{Y_{pt}}{Y_{ct}} = \frac{A - a}{bY_{co}e^{rt}} + \frac{B}{b} \tag{5.5}$$

Differentiating the above expression with respect to time gives:

$$\frac{d\dfrac{Y_{pt}}{Y_{ct}}}{dt} = \frac{-r(A - a)}{bY_{co}e^{rt}} \tag{5.6}$$

Since the denominator is positive we notice that the relative income gap will widen through time (i.e. the level of income in the periphery will *fall* relative to that in the centre) if $(A - a) > 0$. Now a is the constant term in the import demand function for the periphery, which will be negative if the income elasticity of demand for imports from the centre is greater than unity.[1] The constant term, A, in the centre's import demand function will be positive if the income elasticity of demand for imports from the periphery is less than unity.[2] Therefore $(A - a) > 0$. Seers notes that the growing disparity will be even greater as far as *per capita* income is concerned if population growth is faster in the periphery than the centre. This would be true, of course, in Prebisch's model too. Capital flows could hypothetically stop the relative income gap from widening, by allowing unbalanced trade, but no country can go on building up debts for ever. Import substitution is another possibility, but the task is collosal. In terms of the equations of the model, it would mean, in effect, making the import function for the periphery look like that of the centre; or, in other words, nothing short of structural change to reduce the periphery's income elasticity of demand for manufactures and to raise the income elasticity of demand for the periphery's exports (to raise the centre's income elasticity of demand for imports).[3]

An Export-Growth Model of Regional Growth-Rate Differences

It is possible to combine the ideas of Myrdal with the insights of Prebisch and Seers in a single model, which focuses on the role of export growth in the development process in an open economy and in which the Prebisch result emerges as a special case if relative prices are fixed and trade is balanced. The model is applicable to regions and open developing economies alike.[4] It takes as its starting point the not unreasonable assumption that the output of an open economy is demand-determined, not supply-constrained, and that it is the long-run growth of autonomous demand that governs the long-run rate of growth of output. The main component of autonomous demand in an open economy, in turn, is demand emanating from outside the region, i.e. the demand for a region's exports. The model is a variant of export-base models of development which stress the importance of exports as a leading sector. The hypothesis is that once a region obtains a growth advantage it will tend to sustain it at the 'expense' of other regions because faster growth leads to faster productivity growth (the so-called **'Verdoorn effect'**) which keeps the region competitive in the export of goods which gave the region its growth advantage in the first place. 'Success' breeds success, and 'failure' breeds failure! In this section attention will be confined to outlining the model. An examination of the international evidence of the relation between the growth of exports and the growth of output in developing countries will be left until Chapter 15.

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[1] In other words, with a linear import demand function, the intercept of the function must be negative for the ratio of imports to income to increase as income rises, which is what is implied if the income elasticity of demand for imports exceeds unity.

[2] By analogous reasoning to the above.

[3] A fuller discussion of balance-of-payments constrained growth, and the role of various adjustment mechanisms, is given in Chapter 16.

[4] The model is discussed more fully in Dixon and Thirlwall (1975).

Let:

$$g_t = \gamma(x_t) \tag{5.7}$$

where g_t is the rate of growth of output in time t, x_t is the rate of growth of exports in time t, γ is the (constant) elasticity of output with respect to export growth (= 1 if exports are a constant proportion of output), and t is discrete time. Apart from the theoretical considerations underlying the specification of equation (5.7), that the rate of growth of the economy as a whole will be governed by the rate of growth of autonomous demand, there are a number of practical considerations that make export demand for highly specialised regions (or countries) extremely important for both demand and supply. In most industries in a region, local demand is likely to be trivial compared with the optimum production capacity of the industries. The viability of regional enterprise must largely depend on the strength of demand from outside the region. There are also a number of important reasons why export demand may be a more potent growth-inducing force than other elements of demand, especially in open, backward areas – regions or countries. The first is that exports allow regional specialisation, which may bring dynamic as well as static gains. Second, exports permit imports, and imports may be important in developing areas which lack the capacity to produce development goods themselves. Third, if the exchange of information and technical knowledge is linked to trade, exporting facilitates the flow of technical knowledge which can improve the area's supply capacity.

Now let us consider the determinants of export demand and the form of the export demand function. It is conventional to specify exports as a multiplicative function of home prices, foreign prices and foreign income implying constant price and income elasticities. Thus:

$$X_t = P_{dt}^{\eta} P_{ft}^{\delta} Z_t^{\epsilon}, \tag{5.8}$$

where X is the quantity of exports in time t, P_d is the domestic price in time t, P_f is the foreign price in time t, Z is foreign income in time t, η is the price elasticity of demand for exports (< 0), δ is the cross elasticity of demand for exports (> 0), and ϵ is the income elasticity of demand for exports (> 0). Taking discrete rates of change of the variables gives the approximation:

$$x_t = \eta(p_{dt}) + \delta(p_{ft}) + \epsilon(z_t) \tag{5.9}$$

where lower case letters represent rates of growth of the variables.

The rate of growth of income outside the region (z) and the rate of change of competitors' prices (p_f) may both be taken as exogenous to the region. The rate of growth of domestic (export) prices will be endogenous, however. Let us assume that prices are formed on the basis of a constant 'mark-up' on unit labour costs so that:

$$P_{dt} = \left(\frac{W}{R}\right)_t (T_t) \tag{5.10}$$

where P_d is the domestic price, W is the level of money wages, R is the average product of labour, and T is 1 + percentage mark-up on unit labour costs. From equation (5.10) we can write:

$$p_{dt} = w_t - r_t + \tau_t \tag{5.11}$$

where lower-case letters stand for the discrete rates of change of the variables.

The model becomes 'circular and cumulative' by specifying the growth of labour productivity as partly a function of the growth output itself (Verdoorn's Law). If the function is linear we may write:

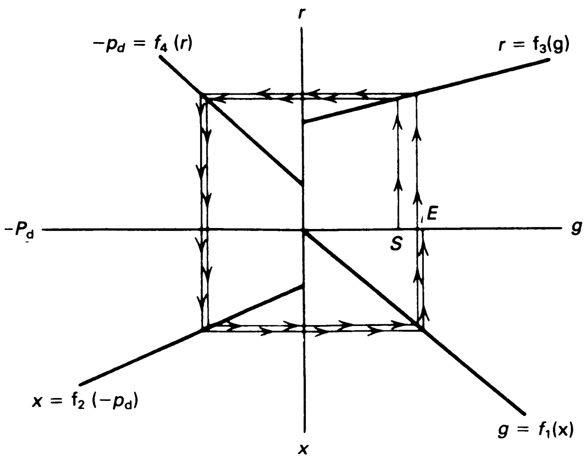
$$r_t = r_{at} + \lambda(g_t) \qquad (5.12)$$

where r_{at} is the rate of autonomous productivity growth at time t, and λ is the Verdoorn coefficient (> 0). Equation (5.12) provides the link between exports and growth via productivity growth and prices. Fast export growth leads to fast output growth, and fast output growth leads to fast export growth by making goods more competitive. Combining equations (5.7), (5.9), (5.11) and (5.12) to obtain an expression for the equilibrium growth rate gives:

$$g_t = \frac{\gamma[\eta(w_t - r_{at} + \tau_t) + \delta(p_{ft}) + \epsilon(z_t)]}{1 + \gamma\eta\lambda} \qquad (5.13)$$

Remembering that $\eta < 0$, the growth rate is shown to vary positively with r_a, z, ϵ, δ, p_f and λ, and negatively with w and τ. The effect of η is ambiguous since it appears in both the numerator and the denominator of the equation. It is clear that it is the assumed dependence of productivity growth on the growth rate which gives rise to the possibility that once a region obtains a growth advantage it will keep it. Suppose, for example, that a region obtains an advantage in the production of goods with a high income elasticity of demand (ϵ) which causes its growth rate to rise above that of another region. Through the so-called Verdoorn effect, productivity growth will be higher, the rate of change of prices lower (other things being the same), and the rate of growth of exports (and hence the rate of growth of output) higher, and so on. Moreover, the fact that the region with the initial advantage will obtain a competitive advantage in the production of goods with a high income elasticity of demand will mean that it will be difficult for other regions to establish the same activities. This is the essence of the theory of cumulative causation, of divergence between 'centre' and 'periphery' and between industrial (developed) and agricultural (developing) regions (countries). **Figure 5.3** illustrates the model graphically.

Figure 5.3



The distance of each of the linear functions from the origin reflects factors affecting each variable other than the variable specified in the functional relation. From the initial condition, S, the growth rate is shown converging to its equilibrium value E, as determined in equation (5.13).[1] The link that the Verdoorn relation provides between exports and growth via productivity and prices, and its sustaining influence, is clearly seen. And the greater the dependence of productivity growth on the growth of output (i.e. the higher λ), the higher the equilibrium growth rate will be and the greater the divergence between regional growth rates for given differences between regions in the other variables and parameters.

An important implication of the model we have developed is that an autonomous shock will not be sufficient to raise a lagging region's growth rate permanently unless the autonomous shock favourably affects the parameters and variables of the model, or is a sustained shock. On these grounds, the relevance of policies of devaluation in a national context, or wage subsidies in a regional context, for improving a region's growth rate may be called into question. What is likely to be required is structural change, in particular structural change to improve the demand characteristics of exports. It is recognition of this point which accounts, among other things, for the emphasis placed by developing countries on industrialisation and the restructuring of world trade to allow their manufactured goods easier access to world markets (see Chapter 15). Notice also from the model that if relative prices in international trade do not change, equation (5.13) would reduce to:

---

[1] Under certain circumstances, the growth rate may not converge to its equilibrium level. This depends on the behaviour of the model out of equilibrium. See Dixon and Thirlwall (1975).

$$g_t = \gamma \epsilon (z_t) \tag{5.14}$$

and if balanced trade is a requirement ($m = x$):

$$g_t \pi = \epsilon (z_t) \tag{5.15}$$

where π is the income elasticity of demand for imports. Thus with relative prices fixed, the growth elasticity with respect to exports (γ) must equal the reciprocal of the income elasticity of demand for imports (π) in the balanced trade models of Prebisch and Seers. Again we end up with the simple rule that one country's growth rate (g) relative to others (z) depends on the ratio of the income elasticity of demand for the country's exports relative to its imports (or the other country's exports in a two-country model), i.e. from (5.15):

$$\frac{g_t}{z_t} = \frac{\epsilon}{\pi} \tag{5.16}$$

Theories of Dependence and Unequal Exchange

Apart from the ideas of circular and cumulative causation and balance of payments constrained growth, there are also a number of theories and models in the Marxist tradition (many originating from Latin America and France) concerned with **dependency, exploitation and unequal exchange** which attempt to explain the perpetuation and widening of differences between centre and periphery. These theories may be regarded as complementary to, and an integral part of, the mechanisms we have already been discussing. For example, part of the dependency and unequal exchange relation is related to the characteristics of trade; but there are many other important dimensions to the argument, e.g. the dependence of the periphery on foreign capital and the expropriation of the surplus by the centre; the dependence on foreign technology; terms-of-trade deterioration; mechanisms which reduce real wages in developing countries below what they would otherwise be, and various socio-cultural aspects of neocolonialism which thwart the drive to independence and self-reliance. Writers in this tradition include Dos Santos, Baran, Gunder Frank, Amin, and Emmanuel. It should be emphasised at the outset that dependency theory cannot easily be tested empirically; rather it is designed to provide a framework of ideas, to accommodate the many aspects and features of the functioning of the world capitalist economy and the many types of dominance and dependency.

Dos Santos (1970) defines dependence thus: 'by dependence we mean a situation in which the economy of certain countries is conditioned by the development and expansion of another economy to which the former is subjected'. The relation is such that 'some countries (the dominant ones) can expand and can be self-sustaining, while others (the dependent ones) can do this only as a reflection of expansion, which can have either a positive or a negative effect on their intermediate development'. Unequal development must be seen as an integral part of the world capitalist system. Inequality is inevitable because development of some parts of the system occurs at the expense of others. Monopoly power in trade exercised by the centre leads to the transfer of the economic surplus from the dependent countries to the centre, and financial relations which are based on loans and the export of capital by the centre ultimately lead to reverse flows and strengthen the position of the dominant country in the dependent country.

Different forms of dependence may be distinguished, as they have evolved historically. First, there is colonial dependence based on trade and the exploitation of natural resources. Secondly, there is financial-industrial dependence, which consolidated itself at the end of the nineteenth century, and which has geared the economic structure of dependent nations to the needs of the centre. Thirdly, a new type of dependence has emerged in the post-war era since 1945 based on multinational corporations which began to invest in industries geared to the internal market of developing countries. This is a technological–industrial dependence. Santos argues that each of these forms of dependence has so conditioned the internal structure of peripheral countries, that this itself has become part of the dependency relation; for example, the highly dualistic structure, the income inequality and conspicuous consumption of the wealthy classes; a dependency mentality and the ingrained habit of seeking outside help, and the unholy alliance between the domestic ruling elite and foreign interests, all conspire to impede internal development. Thus Santos (1973) maintains that dependency is not simply an external phenomenon; it also has to do with the supportive power groups within the poor countries themselves who find the status quo profitable:

> if dependency defines the internal situation and is structurally linked to it, a country cannot break out of it simply by isolating herself from external influence; such action would simply provoke chaos in a society which is of its essence dependent. The only solution therefore would be to change its internal structure; a course which necessarily leads to confrontation with the existing international structure.

Baran (1957), Frank (1967) and Amin (1974) focus their attention more squarely on the traditional Marxist mechanisms by which capitalism in general, and international capitalism in particular, aid the rich in exploiting the poor. Emphasis is placed on the expropriation and transfer of the surplus produced by labour to the owners of capital, which operates at different levels. Think of a cone, the base of which represents the rural poor producing a surplus from their labours in the fields or down the mines. This surplus is first siphoned off by those in the provincial towns, by small employers and merchants. The wealth of these towns, in turn, is sapped by the capital cities, and finally, part of this wealth is siphoned away by foreign investors who repatriate it to the apex of the cone – the rich world. The multinational corporations are seen as the modern instrument for the expropriation of surplus value. Neo-marxists allow for a residue of surplus, but argue that if it is reinvested in the periphery or left in the hands of local elites, it will not be used appropriately for development purposes. As in Dos Santos's model, the system hinges on the collaboration of the governing elite who live in the capital city, who think like, and identify with, their ex-colonial masters. So poor countries, despite formal political independence, remain locked into an old system of economic dependence which perpetuates underdevelopment.

For Frank, like Santos, underdevelopment is a natural outcome of the world capitalist system since the development of some countries inevitably means the distorted development or underdevelopment of others. Development itself perpetuates underdevelopment, a process which Frank has coined 'the development of underdevelopment'. Frank sees the origins of the process in colonisation, which started as a form of economic exploitation, and which has distorted the economic structure of third world countries ever since. The developing countries were forced into the position of suppliers of raw materials for industrial countries, thus effectively blocking industrial development in the primary producing countries themselves. The whole export orientation and foreign dominance of these countries has limited the growth of the domestic market and the establishment of basic national industries for widespread development throughout the whole economy. The international, national and local capitalist system alike generates economic development for the few and underdevelopment for the many. The solution would appear to be nothing short of social and political revolution.

■ Unequal Exchange

The theory of unequal exchange owes its name to Emmanuel (1972). Exchange is unequal between rich and poor countries because wages are lower in poor countries, and lower than if the rate of profit in poor countries was not as high as in rich countries. In other words, exchange is unequal in relation to a situation where wages would be equalised. 'Inequality of wages as such, all other things being equal, is alone the cause of the inequality of exchange.' Let us illustrate the model diagrammatically and show its affinity with the ideas of those who stress the terms of trade as the main mechanism through which the gains from exchange are unequally distributed. Take two countries, and call them 'centre' (c) and 'periphery' (p). Assume that prices in the two countries are based on a percentage mark-up (r) on unit labour costs, so that:

$$P_c = w_c\left(\frac{L}{O}\right)_c(1 + r_c)$$

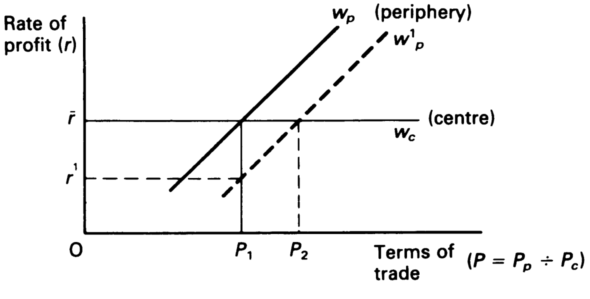
and

$$P_p = w_p\left(\frac{L}{O}\right)_p(1 + r_p)$$

where w is the money wage rate, and wL/O is wage costs per unit of output. Now assume that for institutional reasons $w_c > w_p$ and that the mark-up or rate of profit equalises between the two countries. The theory of unequal exchange then says that because of this, the terms of trade will be worse for the periphery than if wages in the periphery were higher and the rate of profit lower. This can be illustrated diagrammatically, taking the price of the centre's goods as *numéraire* so that $P_c = 1$. See **Figure 5.4**.

In the centre, the given rate of profit ($\bar{r}$) and wage rate (w_c) gives a constant price (P_c) which acts as *numéraire* (hence the horizontal line, w_c). In the periphery, at a given wage (w_p), there is a positive relation between the rate of profit and terms of trade (P) given by the upward-sloping line w_p. The equilibrium terms of trade is given at P_1. An increase in periphery wages shifts the periphery curve rightwards to w_p^1 giving a new terms of trade P_2 at the same rate of profit. Unequal exchange is measured as the difference between the actual terms of trade (P_1) and what it would be if wages were higher in the periphery and the rate of profit was lower at r^1. The 'explanation' of unequal exchange is unequal wage rates.

Figure 5.4



The model does not get us very far, however, without understanding why there are wage differences between centre and periphery. In Emmanuel's model, the wage differences are institutionally determined outside the model, whereas in practice there are many factors that impinge on wage differences within the model itself which need consideration. Moreover, money wage differences may not be the only factor leading to unequal exchange. If money wage differences between centre and periphery reflect differences in labour productivity, the terms of trade between periphery and centre will not be nearly as bad as suggested by money wage differences alone. Indeed, if differences in money wages are exactly matched by differences in productivity, there would be no difference in money wage costs per unit of output and no difference in relative prices 'caused' by differences in money wages. There can still be unequal exchange in the Emmanuel sense by virtue of the way Emmanuel defines the concept, but if the cause of low wages is low productivity it is not a simple institutional matter to raise them.[1]

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[1] Within this framework, movements in the terms of trade can be seen as the outcome of differences in the movement of productivity on the one hand and whether money wage changes fully match productivity changes on the other. If money wage increases fail to match productivity increases in the periphery, for example, so that real wages do not rise as fast as productivity, whereas they do in the centre, there will be a steady deterioration in the terms of trade of the periphery. This is the essence of the Prebisch argument (see Chapter 15).

On the other side of the coin if there is no good reason why the rate of profit should equalise between the two countries, a higher rate of profit in the centre could be an independent source of unequal exchange between centre and periphery, and also an explanation of why wages are depressed in the periphery. If account is taken of the characteristics of the goods produced by the centre and periphery – manufactured goods in the centre subject to decreasing costs, and primary commodities in the periphery subject to increasing costs – we can predict that oligopolistic structures will develop in the centre, while competitive structures prevail in the periphery, with a tendency, therefore, for the rate of profit to be higher in the centre. The lower rate of profit in the periphery, and the attempt by capitalists to keep up the rate of profit in the face of competition, leads to the depression of wages in classic Marxist style.

Questions for Discussion and Review

1. What do you understand by the terms: technological dualism, sociological dualism and geographic dualism?
2. Is dualism avoidable in the development process?
3. In what ways might dualism impede the functioning of the total economy?
4. In what senses is Myrdal's theory of circular and cumulative causation a challenge to static equilibrium theory?
5. What are the media through which the process of circular and cumulative causation work?
6. If backward regions suffer 'backwash' effects from regions of expansion, would they be better off as sovereign states?
7. What is the so-called 'Verdoorn effect' and its importance in the process of circular and cumulative causation?
8. What do you understand by the theory of unequal exchange?
9. What do the centre–periphery (or North–South) models of Prebisch, Seers, Dixon and Thirlwall, and Kaldor all have in common?
10. What are the various 'Marxist' explanations of the growing divergence between rich and poor countries?

■ *Chapter 6* ■

Population and Development

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■ Introduction

The relation between population growth and economic development is a complex one, and the historical quantitative evidence is ambiguous, particularly concerning what is cause and what is effect. Does economic development precede population growth, or is population growth a necessary condition for economic development to take place? Is population growth an impediment or a stimulus to economic development? Many people consider rapid population growth in the Third World to be a major obstacle to development, yet there are many ways in which population growth may be a stimulus to progress, and there are many rational reasons why families in developing countries choose to have many children. The complexity of the subject is compounded by the fact that, as we saw in Chapter 1, economic development is a multi-dimensional concept, and if the measure of development is to be translated into a measure of welfare, there are also complex philosophic questions involved relating to the meaning of welfare maximisation and the concept of an optimum population which has preoccupied welfare economists for centuries. If it could be shown, for example, that slower population growth leads to a higher rate of growth of *per capita* income, or fewer people means higher living standards, would this mean that if society adopted successful policies of population control it would be better off? The utilitarian approach to welfare would say not necessarily. The utilitarian adopts a total welfare criterion, as Sidgwick did in his *Methods of Ethics* (1907):

> if the additional population enjoy on the whole positive happiness, we ought to weigh the amount of happiness gained by the extra number against the amount lost by the remainder. So that, strictly conceived, the point up to which, on utilitarian principles, population ought to be encouraged to increase is not that at which *average* [emphasis added] happiness is the greatest possible – as appears to be often assumed by political economists of the school of Malthus – but at which the product formed by multiplying the number of persons living into the amount of average happiness reaches its maximum.

On the other hand, instinctively and intuitively, most people are not utilitarian.

In conditions of poverty, if increments to population reduce the average standard of living still further, most people would no doubt think it perverse to call this an improvement in welfare simply because the number of people 'enjoying' such an impoverished state had risen. As Cassen (1976) has put it: 'concern for the never born (as opposed to those actually born, past and future) may be something of a luxury'. Rawls (1972), in *A Theory of Justice*, invites us to think of a rational observer having to choose membership of one or other society from behind a veil of ignorance as to where in each society he would find himself placed. With a moderate degree of self-interest, Rawls argues, he would probably choose the society which rejects utilitarianism and adheres to the *per capita* criterion. And yet a population policy based on maximising *per capita* income has frightening implications (not entirely fanciful) for all sub-marginal groups in society that may be deemed to be depressing the average standard of life (see later the discussion of optimum population).

Where does all this leave the welfare basis for population control programmes? A surer basis lies not in diminishing returns to population (indeed there may be increasing returns, in which case the utilitarian debate becomes irrelevant), but in the divergencies between the private and social benefit from large numbers of children. For example, each individual family may prefer to have fewer children if it knew all other families would have fewer children, but it is not willing to limit the number of children in isolation. This is an example of what is known in welfare economics as '**the isolation paradox**', and establishes a case for public intervention. It is the young who suffer from more children because most of the costs arise in the future. Present parents may enjoy their children, but their children may wish their parents had had less, and they probably would have had less if they could have been sure that everybody else would have had less too. A further reason for public intervention in the field of population control may be market failure if it can be shown that families have more children than they actually want and that there is an unmet need for family planning services. It is interesting to note that surveys of desired family size in developing countries consistently put the figure at one or two lower than the actual family size. Apart from this, it could be argued that it is a basic human right to be able to choose freely and responsibly the number and spacing of children. This indeed was the resolution endorsed by Bucharest World Population Conference in 1974 which laid the foundation for the World Bank's increased support for population control programmes throughout the Third World.

Now let us outline the facts on world population and then consider in more detail the conflicting role of population growth in the development process.

■ Facts About World Population

The pertinent facts about the growth of world population, and predictions concerning what the future holds in store, are given in **Table 6.1**. Column 1 shows the **crude birth rate** per 1000 of the population and the relative decline in the rate since 1965. Column 2 shows the **crude death rates** which have declined dramatically in many countries. The average annual growth in population is the outcome of the average difference between the average birth and death rate over the period considered. Column 4 shows the future projected annual growth of population to the year 2000, and the projected level of population in the year 2000. Column 3 gives the **fertility** rate, which is the number of children who would be born per woman if she were to live to the end of her child-bearing years and bear children at each age in accord with prevailing age-specific fertility rates. The fertility rate, and the number of girls born per woman (the **net reproduction rate**), strongly influences the future level of population.

At the present time the world's population is just over 5000 million, of which more than two-thirds live in the developing countries, and over one-third resides in Asia. This level compares with approximately 250 million at the time of Christ, and less than 1000 million as recently as 1800 AD. The current rate of growth of world population is just under 2 per cent per annum, which has no precedent historically. From AD 1 to 1750 the rate was no more than 0.05 per cent per annum; from 1750 to 1850, 0.5 per cent annum; and even be-

Table 6.1 ***Demography and Fertility***

	Crude birth rate (per 1,000 population)		*Crude death rate (per 1,000 population)*		*Total fertility rate*	*Projected population growth (%) and level (millions)*	
	1965	*1990*	*1965*	*1990*	*1990*	*1989–2000*	*2000*
Low-income economies	**42 *w***	**30 *w***	**16 *w***	**10 *w***	**3.8 *w***	**1.8 *w***	**3 670 *t***
China and India	**41 *w***	**25 *w***	**14 *w***	**8 *w***	**3.1 *w***	**1.5 *w***	**2 300 *t***
Other low-income	**46 *w***	**38 *w***	**21 *w***	**13 *w***	**5.2 *w***	**2.5 *w***	**1 370 *t***
Mozambique	49	46	27	18	6.4	3.0	21
Tanzania	49	48	23	18	6.6	3.1	33
Ethiopia	43	51	20	18	7.5	3.4	71
Somalia	50	48	26	18	6.8	3.1	11
Nepal	46	40	24	14	5.7	2.5	24
Chad	45	44	28	18	6.0	2.7	7
Bhutan	42	39	23	17	5.5	2.4	2
Lao PDR	45	47	23	16	6.7	3.2	6
Malawi	56	54	26	20	7.6	3.4	12
Bangladesh	47	35	21	14	4.6	1.8	128
Burundi	47	49	24	18	6.8	3.1	7
Zaire	47	45	21	14	6.2	3.0	50
Uganda	49	51	19	19	7.3	3.3	23
Madagascar	47	45	22	15	6.3	2.8	15
Sierra Leone	48	47	31	22	6.5	2.6	5
Mali	50	50	27	19	7.1	3.0	11
Nigeria	51	43	23	14	6.0	2.8	153
Niger	48	51	29	20	7.2	3.3	11
Rwanda	52	54	17	18	8.3	3.9	10
Burkina Faso	48	47	26	18	6.5	2.9	12
India	45	30	20	11	4.0	1.7	1 006
Benin	49	46	24	15	6.3	2.9	6
China	38	22	10	7	2.5	1.3	1 294
Haiti	41	36	21	13	4.8	1.9	8
Kenya	52	45	20	10	6.5	3.5	34
Pakistan	48	42	21	12	5.8	2.7	147
Ghana	47	44	18	13	6.2	3.0	20
Central African Rep.	34	42	24	16	5.8	2.5	4
Togo	50	48	22	14	6.6	3.2	5
Zambia	49	49	20	15	6.7	3.1	11
Guinea	46	48	29	21	6.5	2.8	8
Sri Lanka	33	20	8	6	2.4	1.1	19

Table 6.1 ***Demography and Fertility (continued)***

	Crude birth rate (per 1,000 population)		*Crude death rate (per 1,000 population)*		*Total fertility rate*	*Projected population growth (%) and level (millions)*	
	1965	*1990*	*1965*	*1990*	*1990*	*1989–2000*	*2000*
Mauritania	47	48	26	19	6.8	2.8	3
Lesotho	42	40	18	12	5.6	2.6	2
Indonesia	43	26	20	9	3.1	1.6	209
Honduras	51	38	17	7	5.2	2.9	7
Egypt, Arab Rep.	43	31	19	10	4.0	1.8	62
Afghanistan	53	..	..	..	..	..	..
Cambodia	44	38	20	15	4.5	1.9	10
Liberia	46	44	20	14	6.3	3.0	3
Myanmar	40	31	18	9	3.8	2.0	51
Sudan	47	44	24	15	6.3	2.8	33
Viet Nam	39	31	18	7	3.8	2.1	82
Middle-income economies	**37 *w***	**29 *w***	**12 *w***	**8 *w***	**3.7 *w***	**1.9 *w***	**1 311 *t***
Lower-middle-income	**38 *w***	**30 *w***	**13 *w***	**9 *w***	**4.0 *w***	**2.0 *w***	**771 *t***
Bolivia	46	36	21	10	4.8	2.5	9
Zimbabwe	55	37	17	8	4.9	2.4	12
Senegal	47	45	23	17	6.5	3.1	10
Philippines	42	29	12	7	3.7	1.8	74
Côte d'Ivoire	52	45	22	12	6.7	3.5	17
Dominican Rep.	47	27	13	6	3.2	1.6	8
Papua New Guinea	43	36	20	11	5.1	2.3	5
Guatemala	46	39	17	8	5.4	2.8	12
Morocco	49	35	18	9	4.5	2.4	32
Cameroon	40	41	20	12	5.8	2.9	16
Ecuador	45	30	13	7	3.7	2.0	13
Syrian Arab Rep.	48	44	16	7	6.5	3.6	18
Congo	42	48	18	15	6.6	3.3	3
El Salvador	46	33	13	8	4.2	1.8	6
Paraguay	41	35	8	6	4.6	2.8	6
Peru	45	30	16	8	3.8	2.0	27
Jordan[c]	53	43	21	6	6.3	3.8	5
Colombia	43	24	11	6	2.7	1.5	38
Thailand	41	22	10	7	2.5	1.4	64
Tunisia	44	28	16	7	3.6	1.9	10
Jamaica	38	24	9	6	2.8	0.7	3
Turkey	41	28	15	7	3.5	1.9	68
Romania	15	16	9	11	2.2	0.4	24

Table 6.1 ***Demography and Fertility (continued)***

	Crude birth rate (per 1,000 population)		*Crude death rate (per 1,000 population)*		*Total fertility rate*	*Projected population growth (%) and level (millions)*	
	1965	*1990*	*1965*	*1990*	*1990*	*1989–2000*	*2000*
Poland	17	15	7	10	2.1	0.4	40
Panama	40	24	9	5	2.9	1.6	3
Costa Rica	45	26	8	4	3.1	1.9	3
Chile	34	22	11	6	2.5	1.3	15
Botswana	53	35	19	6	4.7	2.5	2
Algeria	50	36	18	8	5.1	2.8	33
Bulgaria	15	13	8	12	1.9	–0.2	9
Mauritius	36	17	8	6	1.9	0.9	1
Malaysia	40	30	12	5	3.8	2.3	22
Argentina	23	20	9	9	2.8	1.0	36
Iran, Islamic Rep.	46	45	18	9	6.2	3.4	78
Albania	35	25	9	6	3.1	1.5	4
Angola	49	47	29	19	6.5	3.0	13
Lebanon	40	..	..	..	..	..	..
Mongolia	43	35	16	8	4.7	2.5	3
Namibia	46	42	22	11	5.9	3.0	2
Nicaragua	49	40	16	7	5.3	3.0	5
Yemen, Rep.	49	53	27	18	7.7	3.7	16
Upper-middle-income	**35** ***w***	**26** ***w***	**11** ***w***	**7** ***w***	**3.4** ***w***	**1.7** ***w***	**541** ***t***
Mexico	45	27	11	5	3.3	1.8	103
South Africa	40	33	16	9	4.3	2.2	45
Venezuela	42	29	8	5	3.6	2.1	24
Uruguay	21	17	10	10	2.3	0.6	3
Brazil	39	27	11	7	3.2	1.7	178
Hungary	13	12	11	13	1.8	–0.4	10
Yugoslavia	21	15	9	9	2.0	0.6	25
Czechoslovakia	16	14	10	11	2.0	0.3	16
Gabon	31	42	22	15	5.7	2.8	1
Trinidad and Tobago	33	24	8	6	2.8	1.0	1
Portugal	23	12	10	9	1.6	0.4	11
Korea, Rep.	35	16	11	16	1.8	0.9	47
Greece	18	11	8	9	1.5	0.2	10
Saudi Arabia	48	43	20	7	7.0	3.7	21
Iraq	49	42	18	8	6.2	3.4	26
Libya	49	43	17	8	6.7	3.6	6
Oman	50	44	24	6	7.0	3.9	2

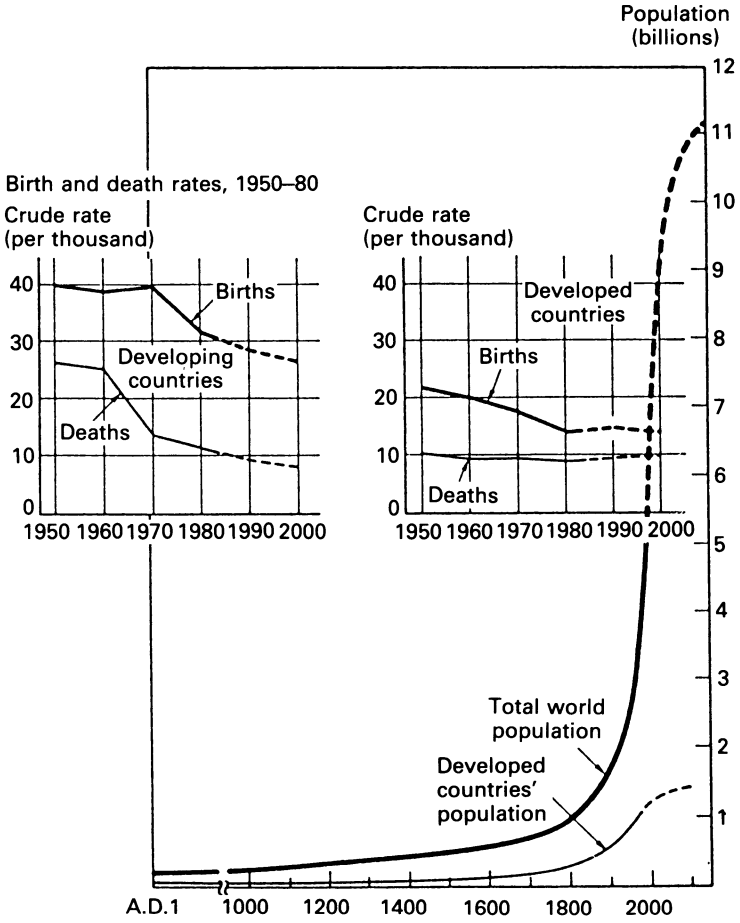
Table 6.1 ***Demography and Fertility (continued)***

	Crude birth rate (per 1,000 population)		*Crude death rate (per 1,000 population)*		*Total fertility rate*	*Projected population growth (%) and level (millions)*	
	1965	*1990*	*1965*	*1990*	*1990*	*1989–2000*	*2000*
High-income economies	**19 *w***	**13 *w***	**10 *w***	**9 *w***	**1.7 *w***	**0.5 *w***	**859 *t***
OECD members	**19 *w***	**13 *w***	**10 *w***	**9 *w***	**1.7 *w***	**0.5 *w***	**841 *t***
Other	**31 *w***	**17 *w***	**6 *w***	**5 *w***	**2.2 *w***	**1.4 *w***	**45 *t***
Ireland	22	16	12	9	2.2	0.1	4
Israel	26	22	6	6	2.8	3.3	6
Spain	21	11	8	9	1.5	0.2	40
Singapore	31	17	6	5	1.9	1.2	3
Hong Kong	27	13	6	6	1.5	0.8	6
New Zealand	23	16	9	8	2.0	0.7	4
Belgium	17	13	12	11	1.6	0.1	10
United Kingdom	18	13	12	11	1.8	0.2	59
Italy	19	10	10	9	1.3	0.1	58
Australia	20	15	9	7	1.9	1.4	20
Netherlands	20	12	8	9	1.6	0.5	16
Austria	18	12	13	11	1.5	0.2	8
France	18	13	11	10	1.8	0.4	59
United Arab Emirates	41	22	14	4	4.6	2.2	2
Canada	21	14	8	7	1.7	0.8	29
United States	19	17	9	9	1.9	0.8	270
Denmark	18	11	10	12	1.7	0.0	5
Germany	17	11	12	11	1.5	0.1	80
Norway	18	13	10	10	1.8	0.4	4
Sweden	16	15	10	12	1.9	0.3	9
Japan	19	11	7	7	1.6	0.3	128
Finland	17	13	10	10	1.8	0.2	5
Switzerland	19	12	10	10	1.7	0.4	7
Kuwait	48	25	7	3	3.4	2.9	3
World	**35 *w***	**26 *w***	**13 *w***	**9 *w***	**3.4 *w***	**1.6 *w***	**6 185 *t***

w stands for weighted average. *t* stands for total.

Source: *World Development Report* 1992.

Figure 6.1 ***Past and Projected World Population, AD 1–2150***



Source: *World Development Report* 1984.

tween 1900 and 1950 it was only 0.8 per cent per annum. The present rate of increase will double world population every thirty-five years, and it can be fairly confidently predicted that, unless there is a very rapid decline in the birth rate or some catastrophe such as a nuclear holocaust, the world's population will be over six billions by the year 2000. The explosive growth of world population is illustrated in **Figure 6.1**, which also shows the actual and projected crude birth and death rates for the developed and developing countries. The gap between the two rates gives the rate of population growth.

The rates of population growth in developing countries in the recent past have been substantially in excess of the rate of growth for the world as a whole, and look like continuing so in the foreseeable future. The average rate of growth for the low- and middle-income countries over the period 1965–90 was 2.2 per cent per annum, compared with 0.8 per cent in the developed countries. By continents, Latin America has experienced the most rapid growth (2.6 per cent), followed by Africa (2.3 per cent) and Asia (1.9 per cent).

The country with the largest population is China, with an estimated current population of 1100 million, followed by India, USA, Indonesia, Japan, Brazil, Bangladesh, Nigeria and Pakistan, all with populations of over 100 million. China and India alone currently add 25 million people to the world's population every year. In the last minute, approximately 300 babies have been born and 150 people have died, increasing the world's population by 150 persons, giving a yearly increase of 80 million.

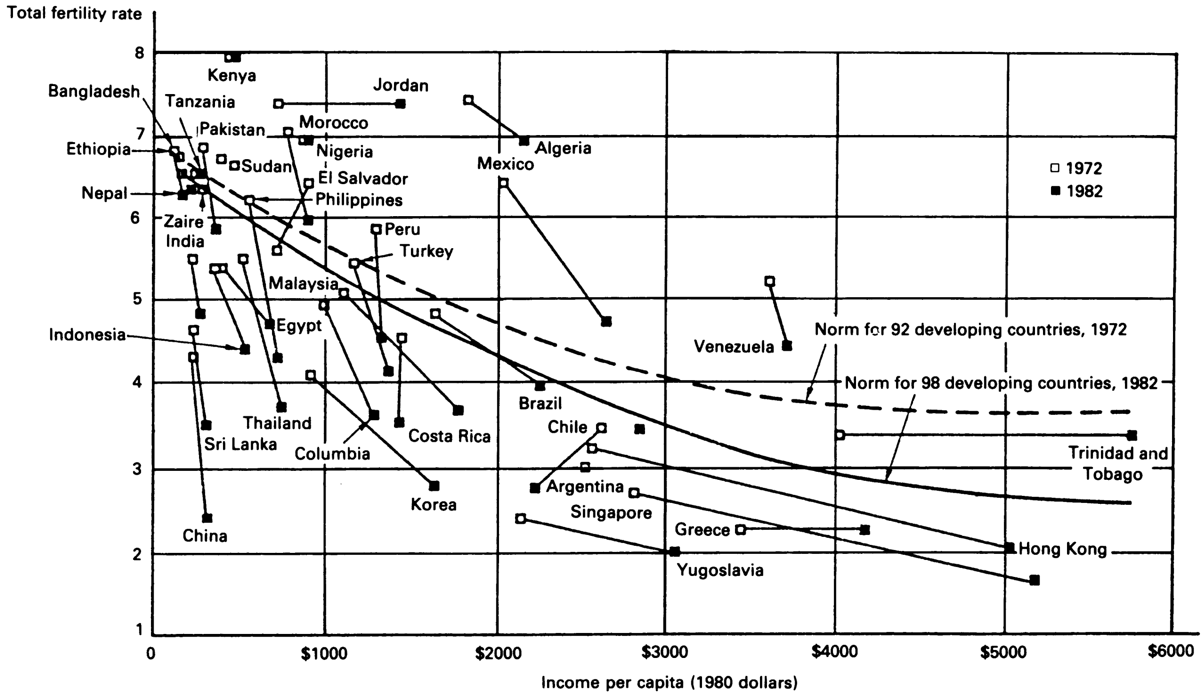
The rate of growth of population is the difference between the number of live births per thousand of the population and the number of deaths per thousand. In a country where the birth rate is 40 per 1000 and the death rate is 20 per 1000, the rate of population growth will therefore be (40 − 20)/1000 = 20 per thousand, or 2 per cent per annum. If (in normal circumstances) a birth rate of 60 per 1000 is considered to be a 'biological' maximum, and a death rate of 10 per 1000 is considered a 'medical' minimum, the maximum possible growth rate of population, ignoring immigration, would be about 5 per cent per annum. These birth and death rates are, in fact, extremes, and are rarely found in practice. The current maximum birth rates recorded are 50 per 1000 in some African countries. For the developing countries as a whole the average birth rate is about 30 per 1000 and the average death rate is now about 10 per 1000, giving an average rate of population increase of approximately 2 per cent annum. This rapid rate of population growth, compared with advanced countries (and also in relation to the growth of national income), can be seen to be the result of relatively high birth rates coupled with death rates almost as low as in advanced countries. If population growth is a 'problem' in developing countries, this is the simple source of the difficulty and the long-run solution is plain.

The vital questions are: can high birth rates be expected to fall naturally with development, and, if so, what is the crucial level of development and *per capita* income at which the adjustment takes place, and how long does the process take? The conventional wisdom used to be that fertility decline would come only with rising levels of *per capita* income, urbanisation, and industrialisation. This is the theory of **demographic transition.** But there is increasing evidence that it can occur with improvement in a wide range of socio-economic conditions: for instance, education and improved opportunities for women which delays marriage and makes women more receptive to contraceptive knowledge; the provision of health services and improved life expectancy; the level of literacy, and access to family planning services. In **Figure 6.2**, the negative association between the level of *per capita* income and fertility is clearly seen, but the downward drift in the curve over time can also be clearly discerned, as well as big differences in the fertility rate between countries at the same level of income, reflecting the influence of the factors mentioned above.

Japan provides a dramatic post-war case study where the birth rate has fallen from 34 per 1000 in 1947 to 11 per 1000 at the present day. It would not be legitimate to generalise from the experience of Japan, but even this case history would suggest a minimum of another twenty years before birth rates are brought into a closer relation with death rates.

The projections of the United Nations predict a much longer time span of adjustment for most countries as indicated in **Table 6.2**, which shows the forecasts for various continents. Even by the year 2000, it is predicted that in Africa and Latin America, birth rates will still be of the order of 30 per 1000. Only in China is it projected that the birth rate might fall close to the level of the developed countries. Part of the reason is due to the young age structure of the population produced by past and current high fertility levels which means that the number of young people greatly outnumbers the number of parents, and thus the number of potential parents in the future far exceeds the existing level. Thus, even if measures are taken to control births, and fertility declines substantially, it can still take decades for the level of population to stabilise because the number of couples having more limited families is greater than the number of couples having larger families. It is estimated that even if fertility rates were reduced immediately to the level of replacement (namely, one girl per woman, which means approximately two children per family), the population of the developing

Figure 6.2 ***Fertility in Relation to Income in Developing Countries, 1972 and 1982***



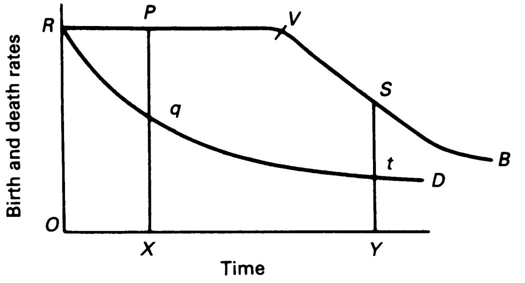
Source: *World Development Report 1984.*

Table 6.2 ***Recent and Forecast Crude Birth and Death Rates***

	Birth rates			*Death Rates*		
	1950–55	*1980–85*	*1995–2000*	*1950–55*	*1980–85*	*1995–2000*
World total	35.6	28.1	23.8	18.3	10.6	8.7
Developed countries	22.7	15.9	14.9	10.1	9.7	10.1
Developing countries	41.8	32.1	26.2	22.2	10.9	8.3
Africa	48.1	45.0	36.9	26.9	15.4	10.6
Middle East	47.9	44.2	36.9	25.3	13.4	9.2
Latin America	41.4	34.4	29.6	14.5	7.7	6.0
China	39.8	20.1	17.4	20.1	8.3	7.7
East Asia	36.6	26.1	20.3	30.0	2.4	6.6
South Asia	43.2	36.9	27.8	24.6	12.5	8.8

Source: United Nations, *World Population Trends and Prospects 1950–2000* (New York, 1979).

Figure 6.3



countries would not stabilise until 50 years into the next century at a level almost double that at present. Thus, because of the population momentum built into the present age structure, the developing countries must accept that whatever they do *now* by way of reducing fertility, their populations will at the very least probably double over the next two generations.

Given that there may be a lag between the death rate falling and a subsequent decline in the birth rate, rapid population growth may be considered a transitional or more enduring 'problem' for a country depending on the currently prevailing *levels* of the rate of births and deaths. This proposition is best illustrated by means of a simple diagram (**Figure 6.3**). The curves *RB* and *RD* represent the time paths of the birth rate and death rate respectively. Population growth is determined by the gap between the two curves. To save drawing more diagrams, let us suppose that points *X* and *Y* in **Figure 6.3** represent two countries with the same current rate of population growth ($Pq = St$). In the case of country Y, population growth will soon slow down since the death rate has reached its minimum and the birth rate is falling. In the case of country X, however, which has the same *current* population growth, the population growth rate can be expected to increase in the future as the gap between the birth and death rate widens. The death rate is falling but the birth rate remains constant to the point *V*; only after this point will population growth decrease. Here, then, are two countries with the same observed population growth in the present but with radically different future prospects. In comparing countries, and their population 'problems', the time profile of countries must be borne in mind. But the crucial question, as we suggested earlier, is, what is the length of the time lag between the death rate falling and the downturn of the birth rate? It is the length of this lag which determines the short-run prospects of countries emerging from a transitional state and attempting to 'take-off' into self-sustaining growth.

The experience of the developing countries today has no historical parallel, at least in Western Europe. In nineteenth-century Europe birth and death rates tended to fall together and a situation never arose of population growth in excess of 2 per cent per annum. It could almost be argued that the 'balance of nature' has been upset in the present developing countries. The introduction of public-health measures and medical attention has reduced death rates suddenly and dramatically, but the means and known-how to effect an equally dramatic fall in the birth rate have not been provided. Modern science and methods of public administration have contributed to the ending of premature death, but have yet to exert a significant impact on births.

The Conflicting Role of Population Growth in the Development Process

Population growth plays a conflicting role in the development process. It can act both as a stimulus and an impediment to growth and development. The question, to which there is no easy answer, is at what point do the economic disadvantages begin to outweigh the advantages? Where does the balance lie?

The common view as far as the developing countries are concerned is that rapid population growth presents an obstacle to the growth of living standards. The argument in a nutshell is that rapid population growth acts as a barrier to capital accumulation and capital deepening, retards the rate of productivity growth and, in general, adds more to the numbers to be supported than to the level of output. A fairly typical remark, representative of the pessimistic school of population economists, is that of Enke (1971):

> The economic danger of rapid population growth lies in the consequent inability of a country both to increase its stock of capital and to improve its state of art rapidly enough for its per capita income not to be less than it otherwise would be. If the rate of technological innovation cannot be forced, and is not advanced by faster population growth, a rapid proportionate growth in population can cause an actual reduction in income per capita. Rapid population growth inhibits an increase in capital per worker, especially if associated with high crude birth rates that make for a young age distribution.

Hoover and Coale (1958), in a study of population growth and development based on Indian experience, also remark:

> While greater numbers in the labour force add to the total product, faster growth of the labour force implies a lower output per worker than slower growth. The reason for this result is that with a faster growing labour force more capital must be directed to provide tools and equipment for the extra workers so that they will be as productive as the existing labour force, and thus less will be available, ceteris paribus, for increasing output per worker.

The arguments made do not sound unreasonable but they are rarely backed by direct empirical evidence, nor do they recognise the findings in some countries (as pointed out in Chapter 2) that increases in capital per worker account for only a small proportion of increases in output per worker, and that the major part of increases in output per worker appears to be due to increases in output per unit of total inputs. There are simulation studies for individual countries (see Enke (1971), (1966)) showing a negative relation between population growth and capital accumulation but these studies invariably hold total factor productivity growth constant, which may be mistaken if population growth and total factor productivity growth are positively correlated.

The effect of population growth on savings is also a good deal more theoretically complex than the above arguments suggest. The traditional argument is that population growth reduces the community's savings ratio by leading to a high dependency ratio of children who consume but do not produce. Ignoring the fact that many young children do, in fact, work in developing countries, the implication of the argument would seem to be that a reduction in population growth would increase the savings ratio by 'raising' the age structure of the population. In the process, however, it must be remembered that many older members of the community also consume without producing and that the proportion of retired members of the community to the total population will rise as population growth slows. Thus what happens to the aggregate savings ratio as the population growth rate changes will depend on how the composition of the *total* dependency ratio alters, and on the propensity to save (dissave) of the two groups of dependents. For example, if the propensity to dissave of the retired was greater than that of the inactive young, the aggregate savings ratio might fall with a reduction in the birth rate as the retired dependency ratio rose. Thus while it is certainly true that both groups of dependants dissave,[1] it would be wrong to conclude that countries with high rates of population growth will necessarily have lower savings ratios, other things

---

[1] The evidence from Leff, taking a cross-section of seventy-four developed and developing countries, is as follows (t values in parentheses):

$$\begin{aligned} \ln S/Y = {} & \underset{(5.72)}{7.34} + \underset{(2.88)}{0.16}\ \ln Y/N + \underset{(3.28)}{0.03}\ \ln g \\ & - \underset{(4.64)}{1.35}\ \ln D_1 - \underset{(2.56)}{0.40}\ \ln D_2 \end{aligned}$$

where ln denotes logarithm of the variables; S/Y is the savings ratio; Y/N is *per capita* income; g is the growth of *per capita* income; D_1 is the proportion of the population under 14; and D_2 is the proportion of the population over 65. Analysing the samples of developed and developing countries separately gives the same negative signs on D_1 and D_2 but in the developed countries the magnitude of the coefficient on D_2 is higher than that on D_1. See Leff (1969).

equal, than countries with lower rates of population growth. On the contrary, in fact, in the very long term the savings ratio will tend to rise with the rate of population growth owing to the increase in the ratio of active to non-active households. This is one of the predictions of the life-cycle hypothesis of saving (see Modigliani (1970)). In the long term, when the population is in balanced growth, the age structure of the population will be uniquely related to the rate of population growth, and the same effect on the savings ratio can be expected from population growth as from the increase in income due to productivity growth. It should also be remembered that the effect of children on a society's total savings works primarily through the family as a unit and depends on how the family reacts to the increase in the number of children. There may just be a substitution of one form of expenditure (on children) for another. Alternatively, the family may work harder to provide for the children, in which case there would be no adverse effect on saving at all. Saving in some families may even increase if there is a sufficient increase in output and a high degree of substitution. The degree of substitution between one form of expenditure and another will depend on the ability to substitute determined by living standards and the level of saving already achieved.

The question of an output response from population pressure comes back to the point made earlier of the possibility of a positive relation between population growth and total productivity growth. The argument that a slow-down of population growth would raise the savings ratio assumes that the factors that determine output are independent of the number of dependents for whom provision has to be made. But it may well be that the sheer increase in numbers creates work and production incentives which affect output and productivity favourably. In fact there is a good deal of theory and empirical evidence suggesting a positive relation between population growth and the growth of output per unit of labour, especially in the manufacturing sector, assuming some growth in the labour force as population expands. This is **Verdoorn's Law**, which we discussed in Chapter 5, which hypothesises a positive relation between the growth of the population, employment and output on the one hand and the growth of production per head on the other. The possible explanations for such a relation are numerous. It has been argued (see Chapter 4, p. 120) that an economy with a faster rate of growth of employment and output may be able to learn more quickly and hence raise its rate of technical progress. Second, if there are internal and external economies of scale in production, increased employment and output will lead to a faster rate of growth of labour productivity. Third, there are likely to be economies of scale in the use of capital. Capital requirements, in most cases, do not increase in the same proportion as population. There are many important indivisibilities in the provision of capital, especially in the field of transport and other social-overhead capital. There may even be capital deepening if the life-cycle hypothesis of saving holds – which predicts a positive relation between the savings ratio and population growth provided population is in balanced growth.

It would be misleading to give the impression, however, that all population economists are pessimistic about the influence of population growth on living standards. Clark ((1967) and (1969)) argues that a classification of the developing countries shows that those with the highest rates of population growth have the *highest* rate of increase of production per head, and that historically periods of population growth usually precede and provoke economic growth. Easterlin (1967) suggests that population pressure can favourably affect individual motivation and lead to changes in production techniques which overcome the consequences of population pressure. In this connection it has been argued by Boserup (1965) that a major stimulus to the 'green revolution' has come from the pressure of population on food supply. Easterlin also claims that the young age structure of a country makes it more amenable to change, more receptive to new ideas, more willing to shift resources from low-productivity to high-productivity sectors, and so on, all of which may raise income per head. In Hirschman's model (see Chapter 7), population growth increases the supply of potential decision-makers, expands markets and leads to development via shortages.

The potentially conflicting role of population growth in the development process is highlighted by the difference in attitude towards population increase between the developed and developing countries, and between the developing countries themselves. In many advanced countries population growth is welcomed, at least by governments. In some countries it has been actively encouraged by generous family-allowance provisions (e.g. France) and liberal immigration policies (e.g. Canada). In the developing countries there is a view, held within and outside, that population growth and abundant supplies of labour are serious obstacles to development, but it is by no means unanimously held. In a UN inquiry into the attitudes of countries towards population growth, several countries cited the strain on investible resources that population growth imposes, but other countries did not mention economic drawbacks at all, and pointed to positive advantages of population expansion (United Nations (1964)). Malaysia, for example, mentioned the possibility of substantial external economies of scale in the long run. The Cameroons expressed the view that a lower population growth rate would not contain the pressure to urbanisation and industrialisation which it regarded as an essential ingredient of economic development. Venezuela stressed human resources as the most valuable asset of a country, while Liberia expressed concern over adequate supplies of labour to industry if population growth was curtailed. Among the more developed countries, Ireland and Czechoslovakia both regarded their populations as too low, and detrimental to development. Australia emphasised the importance of population growth for enlarging domestic markets on which her expanding export industries are based. The most non-commital statement can be found in the British reply, but it sums up well the conflict of opinions:

> There is nothing either in experience or in economic theory to indicate that a rapidly growing population makes it easier or more difficult to keep the rate of growth of the national product ahead of that of population. Such empirical evidence as there is, based on international comparison, seems to show that there is no pronounced relationship between the rate of productivity growth and the annual increase in the supply of labour. Whether the rate of growth of national product keeps ahead of that of population depends largely on the balance of other factors.

All that has really been said so far is that population growth presents a paradox. On the one hand increases in population may reduce living standards owing to the adverse effect of population growth on savings and capital per head. On the other hand increases in population and the labour force can raise living standards through learning, specialisation and scale economies which larger numbers, wider markets and a higher volume of output make possible. What may be called the '**paradox of labour**' can be seen more easily by taking the identity $O = P(O/P)$, or in differential form $\Delta(O/O) = \Delta(P/P) + \Delta(O/P)/(O/P)$, where O is output and P is population (and a constant fraction of the population is assumed to work). Decreasing amounts of capital per worker (and possibly diminishing returns to land) imply a negative relation between the terms on the right-hand side of the equations so that output per head is lower than it would otherwise be as the population increases. On the other hand, the possibility of increasing returns, due to the factors mentioned, implies a positive relation between the two terms so that living standards rise as the population increases. The question is, which forces predominate? The debate as to whether population growth is a stimulus or an impediment to the growth of living standards is largely a question of whether the relation between $\Delta(P/P)$ and $\Delta(O/P)/(O/P)$ is significantly positive or negative. If the relationship is negative, then population growth is an impediment to rising living standards, and the growth of output itself may also be impaired. If the relationship is positive then the effect of population growth on the growth of output and output per head is unambiguously favourable.

Evaluating the Effect of Population Growth on Living Standards

To answer the question of whether the growth of living standards would be faster if the growth of the population and the labour force was slower requires a knowledge of the interrelationship between variables in the aggregate production function – specifically the relationship between the rate of growth of population and capital accumulation and between the rate of growth of population and the rate of technical progress. If the rate of population and labour force growth were reduced, for example, we should have to know the effect on the rate of capital accumulation and total productivity growth before being able to conclude that slower population growth would raise living standards. Given the parameters of the production function it is easy to work out the conditions and interrelationships that must prevail in order for slower population growth to raise living standards. It is more difficult, of course, to know whether these conditions will prevail in the real world within individual countries. The assumption of those who argue that population growth is too rapid in developing countries must be that if the growth rate were reduced, total productivity growth and capital accumulation would not be impaired so as to nullify the favourable effect on income per head of a smaller population than would otherwise have existed.

Let us take the Cobb–Douglas production function in its estimating form and derive the conditions under which the growth of *per capita* income would *not* rise if the population growth rate was lower. As before (see equation (2.6)):

$$r_O = r_T + \alpha r_K + \beta r_L \tag{6.1}$$

or in *per capita* terms (subtracting r_L from both sides of the equation):[1]

$$\begin{aligned} r_O - r_L &= r_T + \alpha r_K + \beta r_L - r_L \\ &= r_T + \alpha r_K + (\beta - 1) r_L \end{aligned} \tag{6.2}$$

Totally differentiating equation (6.2) and setting $r_O - r_L = 0$ gives:

$$d(r_O - r_L) = dr_T + \alpha dr_K + (\beta - 1) dr_L = 0 \tag{6.3}$$

Holding total productivity growth constant ($dr_T = 0$) and considering only the effect on capital accumulation, the condition for *per capita* income growth *not* to rise is:

$$\frac{dr_K}{dr_L} \geqslant \frac{1-\beta}{\alpha} \tag{6.4}$$

i.e. if population growth is reduced by 1 per cent, *per capita* income growth will remain unchanged or fall if capital accumulation falls by $(1 - \beta)/\alpha$. If is falls less than this, or rises, *per capita* income growth will be higher.

Holding the rate of growth of capital constant ($dr_K = 0$) and considering only the effect on total productivity growth, the condition for *per capita* income growth *not* to rise is:

$$\frac{dr_T}{dr_L} \geqslant 1 - \beta \tag{6.5}$$

i.e. if population growth is reduced by 1 per cent, *per capita* income growth will remain unchanged or fall if total productivity growth falls by $(1 - \beta)$. If it falls less than this, or rises, *per capita* income growth will be higher.

Allowing both capital accumulation and total productivity growth to vary, the condition for *per capita* income growth *not* to rise is:

$$\frac{dr_T + dr_K \alpha}{dr_L} \geqslant 1 - \beta \tag{6.6}$$

Clearly, the relationship between population growth and *per capita* income growth in practice depends on the values of α and β, and on the relationship between population growth and capital accumulation on the one hand and between population growth and technical progress on the other. Suppose for illustration that production is assumed to be subject to constant returns ($\alpha + \beta = 1$), and that $\alpha = 0.3$ and $\beta = 0.7$. This would imply from equation (6.4) that capital accumulation must not fall by more than 1 per cent in response to a 1 per cent fall in the population growth rate, otherwise *per capita* income growth will fall. From equation (6.5), total productivity growth must not fall by more than 0.3 per cent, otherwise *per capita* income growth will fall. And from equation (6.6), the combined reduction in total productivity growth and capital accumulation (weighted by α, which is the elasticity of output with respect to capital) must not exceed 0.3 per cent, otherwise *per capita* income growth will fall.

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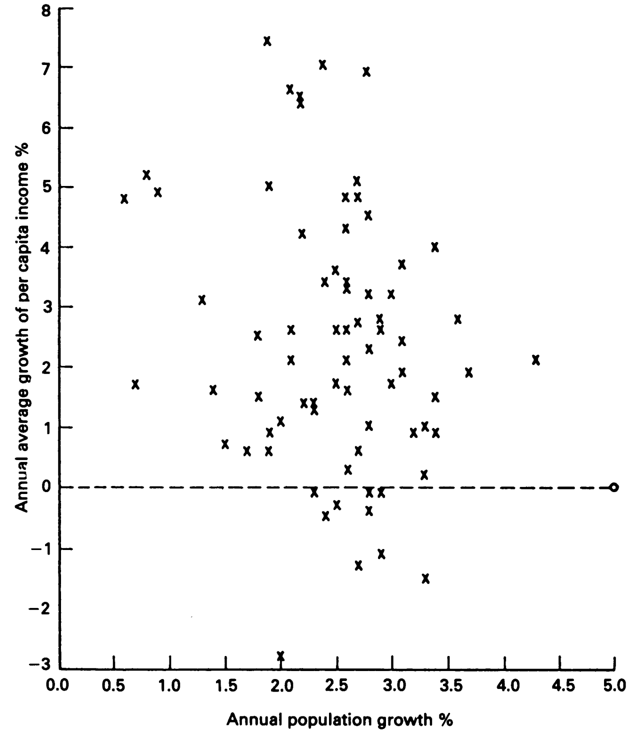
[1] We are assuming throughout the discussion, for the sake of convenience, a constant relation between the current rate of growth of population and the work-force, even though in practice the relation is a lagged one and may not be constant.

The question, then, is what are α and β in practice, and what is the empirical relation between r_L and r_K and between r_L and r_T? In a cross-section study of twenty-three developing countries by the present author (Thirlwall (1972)), the estimate of α is 0.243 and the estimate of β is 0.509. These figures are of the same order of magnitude as estimated by Robinson in his work referred to in Chapter 2 for a sample of thirty-nine developing countries (Robinson (1971)). Turning to the relation between r_L and r_K and between r_L and r_T, the relation between population growth and the rate of capital accumulation appears to be negative, while the relation between r_L and r_T is significantly positive. Countries with a population growth rate of one percentage point above the average appear to experience, on average, a rate of capital accumulation of two percentage points below the average, but a rate of total productivity growth 0.7 percentage points above the average. If we substitute these values of the relationship between dr_L and dr_T and between dr_L and dr_K in equation (6.6) we find that the condition for *per capita* income growth *not* to rise is not satisfied, but only by the barest of margins. The two effects seem roughly to offset each other, leaving the total effect of population growth on the rate of growth of *per capita* income roughly neutral.

Figure 6.4 ***The Relationship Between the Average Rate of Growth of Per Capita Income and Population Growth in Developing Countries, 1960–1980.***



This, indeed, is the conclusion of studies that examine *directly* the relationship between population growth and the growth of living standards by correlating the two variables for a cross-section of countries to see whether the relation is positive or negative. When this is done, there is very little systematic relation to be found between inter-country rates of population growth and rates of growth of *per capita* income. **Figure 6.4** plots a scatter diagram showing the relationship between the average growth of *per capita* income and population in over 50 developing countries for the period 1960–80, and there is clearly no relationship evident. As an exercise, students might like to take their own sample of countries and correlate the rate of growth of population with the rate of growth of *per capita* income, to see what results emerge. Some studies have even found the relationship positive. Kuznets, for example, found the rank correlation positive for a sample of forty developing countries which led him to conclude that 'the implication is that the rate of population growth among underdeveloped countries has no uniform effect on growth in *per capita* product – a denial of the hypotheses [which assume] that high rates of population growth would be particularly limiting on the growth of *per capita* product in the underdeveloped countries with their lower reserves and increased pressure of population on economic resources' (Kuznets (1967)).

The fact that the international cross-section evidence lends very little support to the notion that curbing population growth will have much impact, if any, on the growth of income per head is not to deny, of course, that curbing population growth may be desirable for other reasons, such as to relieve overcrowding, to relieve pressure on food supplies, and, in general, to improve the distribution of income. To be sceptical of an inverse relation between population growth and *per capita* income growth is not to pour cold water on population-control programmes. On the contrary, given the uncertainty of the population-growth/living-standards relationship, and the force of other arguments for limiting numbers, the most sensible strategy is to pursue programmes on the hypothesis that population control increases *per capita* income. In simulation studies of the gains from population control, however, which use the effect on *per capita* income as the criterion for success, it is important that explicit account should be taken of the positive relation between population growth and total productivity growth if the gains are not to be exaggerated. This point is particularly important to bear in mind in evaluating the work of Enke and collaborators, who have tried to estimate the returns from expenditure on population control compared with alternative forms of investment, and to calculate whether investment on birth prevention is more effective than investment in physical capital in raising income per head.

■ Enke's Work

To take up the latter issue first, Enke's work and views (1966) led him to the conclusion that 'resources used to retard population growth can contribute perhaps one hundred times more to higher incomes per head than resources used to accelerate output growth'. The core of the argument is a simple numerical example comparing the impact on average income of equal expenditures either on conventional development projects intended to raise the national income, or on a birth reduction programme. For example, suppose $0.5 million is invested each year in conventional capital projects yielding a rate of return of 15 per cent per annum. This would give an annual output increase of $0.075 million. After ten years, $5 million will have been invested yielding an annual income flow of $0.75 million. If the initial level of income was, say, $500 million, the flow from the new investment represents a proportionate change of 0.0015. Now suppose $0.5 million is invested each year in a birth-control programme fitting intra-uterine devices. If the cost per participant is $1, there would be 500 000 participants on average each year. Assuming that the live-birth fertility of a typical woman participant is 0.15 infants a year, the reduction in births over ten years is (500 000) (0.15) (10) = 750 000. If the initial population is say, five million (which combined with the assumption of $500 million income gives a *per capita* income of $100), the proportionate change in population due to the annual investment in the birth control programme is 0.15. Thus if investment of $5 million in physical capital over ten years gives a growth rate of income of 0.0015, and $5 million invested over ten years in population control gives a proportionate reduction in population of 0.15, then investment to control births is 100 times more effective in raising the rate of growth of *per capita* income than investment in physical capital. Enke comments: 'it is staggering to encounter such ratios when comparing different economic policies'. General amazement could be reduced if it is noticed that this particular ratio is crucially dependent on the values taken for the initial levels of population and income. The lower the population and the higher the income (i.e. the higher the level of *per capita* income) the greater the relative return to birth control programmes, suggesting that rich countries underinvest in birth control programmes – a conclusion opposite to the one Enke presumably wanted to reach (see Curtin (1969)). If the approach is sensible it also implies that the more investment in birth control programmes, the higher the ratio of effectiveness will become; a form of increasing returns to population control. One weakness of the approach is that while Enke concedes that substantial bonuses may have to be paid to encourage the adoption of birth control practices, he does not recalculate the basic numerical example to take account of these additional expenditures. The excuse is that bonuses are simply transfer payments, but transfer payments have alternative investment uses. But the major, serious objection to the whole approach is that it treats changes in population and income as independent whereas they are interdependent. When population growth is reduced, output growth will also be reduced directly if the marginal product of labour is positive, and also indirectly if productivity growth in the economy falls as the population growth rate falls. A reduction in population growth may yield no long-run increase in income per head. It is possible, of course, that an increase in income from investment in physical capital may induce population growth, nullifying also the gains from investment in physical capital in some crude Malthusian manner. But this is much less likely than the former possibility. If anything, direct increases in income seem to have a depressing effect on the birth rate. Indeed many would argue that a precondition for any birth control scheme to be effective is that the level of income is first raised – a view summed up by the aphorism that affluence is the best contraceptive.

Enke (1971) also undertakes traditional cost–benefit analysis to estimate the rate of return to expenditure on birth control programmes. The benefit of a birth prevented is measured by the discounted value of the saved consumption (i.e. by increased saving). Up to the age of 15, when an addition to the population is not productive, Enke calculates a net gain in saving, discounting at 15 per cent, of $280 (at 1960s prices); and between the ages of 15 and 55, when the addition to population is productive, he calculates a net loss of saving of $17, giving a total net benefit to society of a saved birth of $263. The cost of preventing a birth is estimated to be only $5, giving a very high net present value and a high social rate of return on capital invested. Within the framework of the model the most suspect feature of Enke's procedure is that the whole of a child's consumption up to the age of 15 is treated as a reduction in society's saving whereas, in fact, the child may work; the family to which it belongs may reduce their consumption on other things, or the family itself may work harder and produce more to support the child. When these considerations are taken into account, the net gain in saving or saved consumption from the prevention of a birth may be very much less. Also forgotten are the positive externalities that people may confer on one another, not to mention that great leaders, inventors and artists must come from the human stock. Who can say what the long run consequences of saving births will be with such intangible considerations involved? Moreover, to measure the benefits of a lower population simply in terms of additions to saving is extremely narrow in conception. Societies have never placed an infinite valuation on saving, not even Stalinist Russia. The analysis would suggest, taking it to its logical conclusion, that the social optimum would be achieved when consumption per head fell to zero, yielding maximum savings but at the cost of national suicide!

■ Simon's Challenge

The most recent concerted challenge to the thinking and work of Enke, and to the view that population growth is uniformly depressing for the material well-being of mankind, has come from Professor Julian Simon ((1977) (1981) and (1986)). Simon's major thesis is that 'the ultimate resource is people – skilled, spirited and hopeful people – who will exert their wills and imaginations for their own benefit, and so, inevitably, for the benefit of us all'. Simon brings together both the theoretical arguments and empirical evidence on both sides of the population debate and presents his own simulation results on the relation between population growth and living standards. He finds that the initial effects of population increase on *per capita* income are negative, but that in the longer term the positive feedback effects that result from the stimulus of population growth to technological progress and other factors which improve the rate of growth of productivity outweigh the negative effects. Simulations suggest that for countries already industrialised the initial negative effect of population is offset within fifty years. For less developed countries the conclusion is that moderate population growth is more favourable to the growth of living standards than either a stationary population or very fast population growth. An overall judgement on population growth, and whether it is beneficial or not, therefore depends very much on a weighing of the balance between the present and the future. In economics the present and the future are made comparable using the concept of a discount rate. Whether the positive long-run benefits of population growth are considered to outweigh the short-run negative effects depends very much on the discount rate and the time period taken. The less future benefits are discounted and the longer the time period taken, the more beneficial (less detrimental) population growth appears, and the shorter the time period considered and the more future benefits are discounted the less beneficial (more detrimental) population growth appears. There will be some time period and some discount rate at which additional population now is exactly on the borderline of having a negative or positive value.

What are the positive feedback effects that population increase can have on economic progress which vitiates the classical prediction that population growth is uniformly depressing on living standards? In his simulation model of the relationship between population growth and *per capita* income in advanced countries, Simon attempts to capture the effect of additional children on such factors as the savings ratio; labour supplied by the parents; scale economies and technical progress. In his simulation model for developing countries Simon considers the following important feedback mechanisms: the stimulus to new methods in agriculture; the supply response of families; the provision of social infrastructure (particularly transport); scale economies and demand-induced investment. Let us briefly consider some of these factors.

A society under pressure from population growth may be expected to respond by finding new and more efficient ways of meeting given needs. In agriculture, the Malthusian view would be that improvement in agricultural techniques is independent of population and that improvements simply induce more population. Others would argue that even if population pressure does not induce the production of new techniques it certainly induces the adoption of new techniques. It is difficult to see how the green revolution would have occurred without the pressure of numbers on food supply.

Agricultural families may respond to the needs of additional children by changing methods, working harder and producing more. Studies suggest that the elasticity of output to increases in the number of children is about 0.5; that is, an increase in family size, say, from four to five (25 per cent) would result in a 12.5 per cent increase in output. Simon argues that population growth also has a large positive effect on agricultural saving, which tends to be overlooked because a large fraction is non-monetised.

Population pressure provides a stimulus to develop social infrastructure, transport and communication facilities, which have far-reaching external repercussions, extending beyond the additional numbers they were designed to serve. Population growth also makes these facilities more economical to provide because of the scale economies involved in their provision. Simon argues 'if there is a single key element in economic development other than culture and institutions and psychological make-up, that single key element is transportation together with communications'. Adam Smith, an early contemporary of Malthus and much more optimistic about the development process, was impressed by the benefits of communications: 'good roads, canals and navigable rivers, by diminishing the expense of carriage, put the remote parts of the country more nearly upon a level with those in the neighbourhood of the town. They are upon that account the greatest of all improvements – they break down monopolies . . . they open new markets.' To the extent that population growth exerts pressure for these facilities to be provided, a significant output response is to be expected.

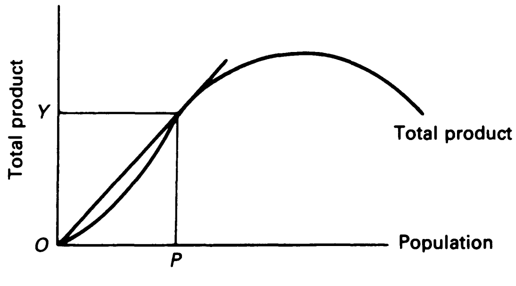
Increased population also has many other types of productivity effects which are subtle and indirect, yet nonetheless very important. It is very difficult, for example, to improve health and sanitation in sparsely populated areas, but once sanitation and health improvement become feasible and economical with greater numbers enormous benefits may result – more than in proportion to the increase in population. A growing population also facilitates change without disrupting the organisation and positions of those already established. Thus government and administration may be expected to improve and become more in keeping with the needs of development. Youth itself has positive advantages. Young people are more receptive to change and modernisation than older people. The younger a population the more education (or human capital) per head of the population. Young people tend to be more mobile which is an asset when structural change is required. With a growing population, investment is less risky. Many economists are of the view that one of the major obstacles to development is not a shortage of savings but a lack of willingness to invest. An expanding market resulting from population growth provides an incentive to investment.

The great difference between the results of Simon and the results of Enke (and of Hoover and Coale cited earlier) is that all the beneficial feedback effects of population on output mentioned above are omitted from the latter analyses. But any of the feedback factors referred to may partially or fully offset the capital-dilution effect of greater numbers in the short run which is the factor that the predictions of conventional models reflect. A complete analysis of the relation between population and living standards must have due regard to the longer term benefits that population expansion can confer on societies, as well as the short-term costs. Indeed, only when the benefits are considered is it possible to comprehend why societies are infinitely wealthier today than centuries ago despite population expansion.

The 'Optimum' Population

What is the 'optimum' population? The term 'optimum population' is used in several different senses, but four, particularly, are commonly employed. First, it is sometimes used to refer to the size of population which maximises the average product or income per head. It is in this situation that a society's savings ratio is likely to be maximised. Thus if the total product curve for an economy is drawn as in **Figure 6.5**, the optimum population is *OP*, where a ray from the origin is tangential to the total product curve. At *OP*, total product (*OY*) divided by population (*OP*), or average product per head of population, is at its maximum. The condition for maximum average product per head is that the marginal and average product per head should be equal. If the marginal product of an addition to the population is above the average, average product could be increased by an expansion of the population. Contrariwise, if the marginal product is below the average, a further increase in population will reduce the average product and the population would exceed the optimum level in the way defined. If there was no saving, the maximisation of product per head would maximise welfare per head because consumption per head would then be at a maximum. On the surface this concept of optimum population seems an attractive one on which to base a

Figure 6.5



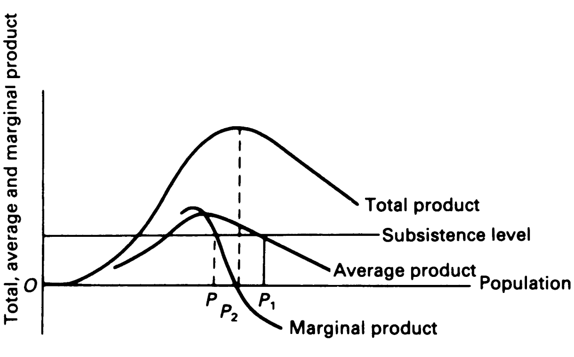
population policy. It provides the greatest scope for maximising savings per head if desired or, in the absence of forced or compulsory saving, it will lead to the maximisation of welfare per head.

Yet a population policy based on maximising *per capita* income has frightening implications (not entirely fanciful) for all sub-marginal groups in society that may be deemed to be depressing the average standard of life.

A second approach to the concept of optimum population adopts the criterion of total welfare maximisation. This is the utilitarian approach, adopted by the English economist cum philosopher, Henry Sidgwick, whose quote we gave earlier (p. 143), that 'the point up to which, on utilitarian principles, population ought to be encouraged to increase is not that at which *average* (emphasis added) happiness is the greatest possible – as appears to be often assumed by political economists of the school of Malthus – but at which the product formed by multiplying the number of persons living into the amount of average happiness reaches its maximum' (Sidgwick (1907)). On this criterion, the population would be suboptimal as long as the marginal product of labour was above some notional welfare subsistence level, and would reach an optimum when all incomes were equalised at the welfare subsistence level (assuming a diminishing marginal utility of income). But in conditions of poverty, if increments to population reduce the average standard of living still further, it seems perverse to call this an improvement in welfare simply because the number of people 'enjoying' such an impoverished state has risen.

A third definition of optimum population refers to the level of population beyond which the average product in an economy falls below the level of production necessary for subsistence on the assumption that the total product is equally shared. In this case, the term 'optimum' simply refers to the maximum population that can be supported with existing resources, and is the point of Malthusian equilibrium. In **Figure 6.6** a population beyond OP_1 could not be supported because the average product of the population would be below the level of subsistence. If total product was not equally shared, a total population of OP_1 would not be supportable, for some would have more income necessary for subsistence and others less. But note that if the product is equally shared, a much larger population can be maintained than the population at which the marginal product falls below subsistence, i.e. OP. In fact, the optimum population, OP_1, is consistent with a negative marginal product.

Figure 6.6



This last point leads us to a fourth sense in which the term 'optimum' population is sometimes used, which is to describe a state of affairs where a country's population is so large that increases in it can only be detrimental to growth – not only detrimental to a country's long-run growth prospects but also to growth in the short run, implying zero or negative marginal product. The population is optimal in this sense when total product is maximised, at OP_2 in **Figure 6.6**. This definition of optimum population is closely linked with the notion of population density and attempts to define underpopulation and overpopulation in terms of the relation between population and resources, and, in particular, land. Since resources, such as land, vary considerably in quality, however, inter-country comparisons of ratios of population to resources must be treated with great care. A country may be regarded as 'underpopulated' in relation to another even though it has a higher population-resource ratio, simply because its technology to exploit resources is superior. Technology will influence the position and shape of the total product curve, and hence the optimum population, for any given ratio of population to resources. In view of the variety of interpretations of the concept of optimum population, the claim that a country is 'overpopulated' or 'underpopulated' needs to be viewed with some scepticism unless a precise definition of terms is given.

A Model of the Low-Level Equilibrium Trap

To repeat, there are two main interrelated reasons why rapid population growth may be regarded as a retarding influence on development. First, rapid population growth may not permit a rise in *per capita* incomes sufficient to provide savings necessary for the required amount of capital formation for growth. Second, if population growth outstrips the capacity of industry to absorb new labour, either urban unemployment will develop or rural underemployment will be exacerbated, depressing productivity in the agricultural sector. It is not inconceivable, moreover, that rises in *per capita* income in the early stages of development may be accompanied by, or even induce, population growth in excess of income growth, holding down *per capita* incomes to a subsistence level. Today we witness falling death rates (associated with development), contributing to population pressure; and presumably for centuries past the population of most countries has been oscillating around the subsistence level, with small gains in living standards (due to 'technical progress') being wiped out either by higher birth rates or such factors as disease, famine and war. One vital question that a theory of economic development must answer is, at what level of *per capita* income can income growth be expected to exceed population growth permanently, thus sustaining further rises in *per capita* income indefinitely? This question cannot be answered at a point in time by casual observation that income growth exceeds population growth, because the very rise in *per capita* income may induce population growth greater than income growth in the future. A full behavioural model is required, and a theory of population which is able to explain the pattern of population growth during the course of development. What happens to population as *per capita* income rises, and what happens to national income, and therefore *per capita* income, as population rises?

Models of the **low-level equilibrium trap** attempt to integrate population and development theory by recognising the interdependence between population growth, *per capita* income, and national income growth. This type of model, which originated in the 1950s, is designed firstly to demonstrate the difficulties that developing countries may face in achieving a self-sustaining rise in living standards, and secondly to provide pointers to policy action. One such model by Nelson (1956), on which we shall concentrate, contains three basic equations dealing with the determination of net capital formation, population growth and income growth. Let us consider these equations separately before examining the simple workings of the model.

☐ Capital Formation

Capital formation takes place through saving and new land brought into cultivation, i.e. $dk = dk' + dR$, where k is capital, k' is savings-created capital and R is land. We shall ignore new land as a part of capital and concentrate on savings-created capital. It is assumed that all saving is invested.

The rate of savings *per capita* (dk'/P) is related to income *per capita* (O/P) in the way shown in **Figure 6.7**. In equation form:

$$\frac{dk'}{P} = b\left[\left(\frac{O}{P}\right) - X\right], \quad \text{where } \frac{O}{P} > \left(\frac{O}{P}\right)' \tag{6.7}$$

and

$$= -C, \text{ where } \frac{O}{P} \leqslant \left(\frac{O}{P}\right)'$$

Figure 6.7

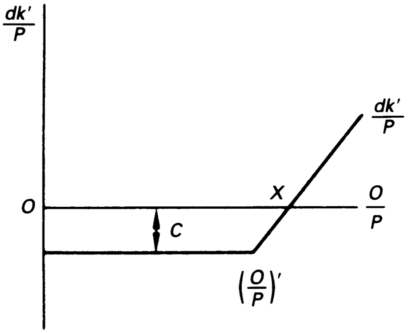
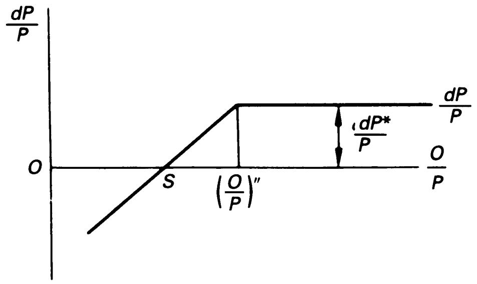


Figure 6.8



Per capita income is so low up to the level $(O/P)'$ that there is disinvestment (dissaving), assumed to be at a constant rate, C. Beyond $(O/P)'$ the rate of savings *per capita* rises linearly with *per capita* income.

□ *Population Growth*

With rising *per capita* income, population growth (dP/P) is first assumed to increase owing to falling death rates. Then at a critical level of *per capita* income $(O/P)''$ population growth reaches a maximum $(dP/P)^*$ where the death rate has fallen to a minimum. Since Nelson's model is short run, the effect of *per capita* income on the birth rate is ignored, but the relation can easily be accommodated if desired. The relation between population growth and *per capita* income can be represented as in **Figure 6.8**. In equation form:

$$\frac{dP}{P} = P\left[\left(\frac{O}{P}\right) - S\right], \quad \text{where } \left(\frac{O}{P}\right) < \left(\frac{O}{P}\right)'' \qquad (6.8)$$

and

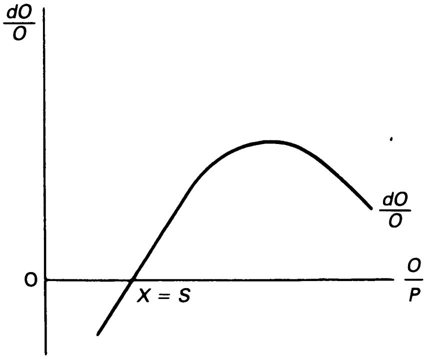
$$= \frac{dP^*}{P}, \text{ where } \left(\frac{O}{P}\right) \geqslant \left(\frac{O}{P}\right)''.$$

S is the subsistence level of *per capita* income. At *per capita* income levels below S, dP/P is negative since the death rate would exceed the birth rate.

□ *Growth of National Income*

Income (or output) is assumed to be a linear homogeneous function of factor inputs, $O = Tf(K, L)$ where K is capital, L is labour (as a constant proportion of the population) and T is an index of 'total' productivity. Technology and the social structure are assumed constant. From the assumptions of the model, the income growth curve can be drawn as in **Figure 6.9**. Where $S = X$ (taken from **Figures 6.7** and **6.8**, population is stationary; the rate of savings-created capital per head is zero, and therefore income will be stationary ($dO/O = 0$). With rising *per capita* income beyond this stationary equilibrium, growth increases

Figure 6.9



owing to increases in the labour force and capital per head. As population growth reaches a maximum, however, and savings as a percentage of national income approach a constant, income growth will level off. In the absence of technical progress, growth will ultimately decrease owing to the law of variable proportions, in this case due to a fall in the capital–labour ratio.

Combining **Figures 6.8** and **6.9**, we have a diagrammatic representation of the possibility of a low-level equilibrium trap situation in which *per capita* income is permanently depressed. **Figure 6.10** shows this. Any level of *per capita* income between the subsistence point ($S = X$) and Oa will be accompanied by a growth of population faster than the growth of income, forcing *per capita* income down. The equilibrium level of *per capita* income will be where the population growth curve cuts the income curve from below. One such point is to the left of Oa, where $S = X$, and this point represents the low-level equilibrium trap. Any level of *per capita* income below Oa will force *per capita* income down to this subsistence level. Contrariwise, any *per capita* income level beyond Oa will mean a sustained rise in *per capita* income until the two curves cross again at Oq. This would be a new stable equilibrium with the population growth curve again cutting the income growth curve from below. To escape from the low-level equilibrium trap, *per capita* income must either be raised to Oa, or the dO/O and dP/P curves must be shifted favourably. The origin of '**big push**' theories of development (see Chapter 7 and below), and the concept of a '**critical minimum effort**', was the belief that to escape from the 'trap' it would be necessary to raise *per capita* income to Oa in one go. If countries are in a trap situation, however, much greater hope probably lies in the dO/O curve drifting upwards over time, through technical progress, or in a sudden drop in the dP/P curve from a reduction in the birth rate. Capital from abroad, raising the dO/O curve, and emigration, lowering the dP/P curve, could also free an economy from such a trap.

To take account of factors other than population growth which may depress *per capita* income, and factors other than increases in capital per head that may raise *per capita* income, the low-level equilibrium trap model can be extended and generalised by adopting Leibenstein's terminology of income-depressing forces and income-raising forces (Leibenstein (1957)). Leibenstein's approach is illustrated in **Figure 6.11**. The curve representing income-depressing forces, Z_t, is measured horizontally from the 45° line, and the curve representing income-raising forces, X_t, is measured vertically from the 45° line. *Per capita* income level Oa is the only point of stable equilibrium. Between Oa and Oq income-depressing forces are greater than income-raising forces and *per capita* income will slip back to Oa. Only beyond Oq are income-raising forces greater than income-depressing forces such that a sustained increase in *per capita* income becomes possible. Oq is the critical *per*

Figure 6.10

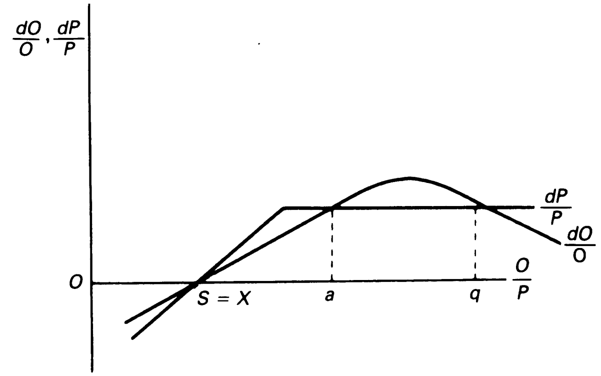
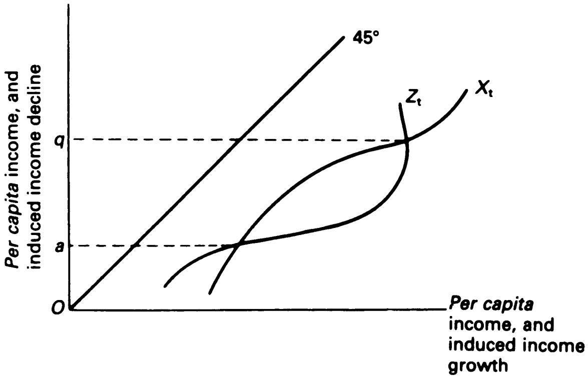


Figure 6.11

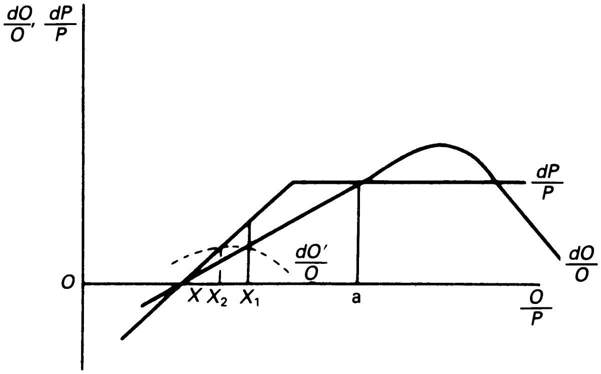

Per capita income, and induced income decline
45°
Z_t
X_t
q
a
O
Per capita income, and induced income growth

capita income level necessary to escape the low-level equilibrium trap.

■ The Critical Minimum Effort Thesis

It has been argued that *if* a low-level equilibrium trap exists, a critical minimum effort will be required to escape from it. This is the so-called **critical minimum effort thesis** which refers to the effort needed, normally measured by investment requirements, to raise *per capita* income to that level beyond which the further growth of *per capita* income will not be associated with income-depressing forces exceeding income-raising forces. But as soon as one begins to calculate the amount of extra investment required to raise *per capita* income in one go, by even a modest amount, it becomes all too obvious that a critical minimum effort, or a 'big push' as it is sometimes called, is not feasible. But, in any case, it is doubtful whether a critical minimum effort or 'big push' is necessary in practice. While it is important to recognise the interdependence between population growth, *per capita* income and income growth, models of the low-level equilibrium trap tend to be unduly pessimistic and restrictive in their assumptions. Furthermore, the prediction of a low-level trap in the absence of a critical minimum effort does not wholly accord with historical experience. Hagen (1959) has drawn attention to the fact that in Western Europe income-induced population growth did not prevent substantial rises in *per capita* income from taking place. On the contrary, Hagen claims that it was not *until* population started to grow rapidly that *per capita* income started to rise, and that population growth preceded income growth rather than the other way round.[1] We hinted earlier that one of the most likely escapes from a Malthusian situation is a permanent fall in the birth rate due to a standard-of-living effect. It is to this effect that Hagen attributes the prevention of a Malthusian situation in nineteenth-century Europe. Birth rates followed death rates downwards long before the maximum possible population growth rate had been reached.

Figure 6.12



What happened in Europe was not the experience of the present developing countries until recently. There are now signs, however, that the birth rate is falling faster than the death rate, and most countries may be out of the trap. There are other potent forces at work which also offer an escape from Malthusianism. The most significant of these forces are technical progress and 'irreversible' additions to the capital stock (especially in the form of social and human capital), the consequence of which is to shift the income growth curve upwards over time so that the level of *per capita* income representing stable equilibrium is continually rising over time. Technical progress was an important source of economic progress in nineteenth-century Europe; it is, potentially, an even greater force in the present developing nations, given their ready access to ideas and technology from countries already developed.

The way in which rising living standards may be regarded as a natural phenomenon, obviating the need for a critical minimum effort, is shown diagrammatically in **Figure 6.12.** Consider a small rise in the *per capita* income level from OX (the subsistence level) to OX_1. The traditional argument is that this will be accompanied by population growth in excess of income growth, causing *per capita* income to fall back to the subsistence level. If time is not abstracted from the analysis, however, it is possible to argue that the increase in *per capita* income from OX to OX_1 will be accompanied by permanent changes in the quality of the capital stock and skills, etc., such that *per capita* income will not fall back to OX but to some higher level, say OX_2. Income growth in the range of *per capita* income OX to OX_2 is now permanently higher, represented by the curve dO/O'. If OX_2 becomes the new stable equilibrium, and the sequence of events is repeated, *per capita* income will reach the level Oa in a series of steps. No critical minimum effort will be needed. With continuous productivity growth due to all forms of technical progress, a 'ratchet' mechanism of the type described is quite feasible, and it is probably by this mechanism that, in practice, countries typically 'take off'.

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[1] French economic historians have blamed their country's comparatively late industrialisation on lack of population pressure.

Most developing countries in the world today are experiencing income growth faster than the rate of growth of population. Whether income growth would be faster if population growth was reduced is an open question. It is possible to conceive of a low-level equilibrium trap, but its level almost certainly rises over time owing largely to technical progress before a reduction in birth rates sets in.[1]

Questions for Discussion and Review

1. What accounts for the population explosion in developing countries during the last thirty years?
2. In what ways may rapid population growth impair development?
3. What are the stimuli which rapid population growth might give to development?
4. What are the weaknesses of Enke's approach to the evaluation of the costs and benefits of population control?
5. What do you understand by the concept of the 'low-level equilibrium trap'?
6. Is it possible to define an 'optimum' population?
7. Why will population continue to grow fast into the next century even if birth rates now are quickly reduced?
8. Why do poor people have large families?
9. It has been said that affluence is its own prophylactic. Does this mean that attempts to control population before living standards rise is futile?
10. What has been the success, and what have been the effects, of birth control programmes in any countries with which you are familiar?

[1] For good surveys of many of the issues discussed in this chapter, see Cassen (1976) and Kelley (1988).

Part IV

Planning, the Allocation of Resources, Sustainable Development and the Choice of Techniques

■ *Chapter 7* ■

Planning and Resource Allocation in Developing Countries

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In this part of the book we turn to major issues of development strategy concerning the use of investment criteria (and particularly social cost–benefit analysis) for the allocation of resources; the concept of sustainable development; the choice of techniques, and the use of the techniques of input–output analysis and linear programming. There will be separate chapters devoted to each of these subjects. In this preliminary chapter, we shall review the debate over the market mechanism versus planning as the means of resource allocation in developing countries, and discuss some of the broader policy issues confronting decision-makers, including some of the early investment criteria for resource allocation suggested by development economists.

The Market Mechanism *vs* Planning

In free enterprise market economies, resources are allocated by the 'invisible hand' of the market in accordance with consumer demand. Market prices act as signals to producers to produce less or more of a commodity according to the changing profitability of production. If consumers consume to the point where marginal utility is equal to price, and producers produce at the point where marginal cost is equal to price, resources will be optimally allocated since the marginal utility of production will just equal the marginal cost. This is the theory, but there are many problems with the model which led developing economies in the past to interfere with the market mechanism and to adopt various forms of planning for the allocation of resources. In the former Soviet Union and the countries of Eastern Europe, planning superseded the market mechanism entirely. There has in recent years, however, been disillusion with planning, and the formerly planned economies of Eastern Europe have swung to the other extreme, embracing the market mechanism almost unconditionally. Is there a middle way for developing countries to follow? Are the conditions required for the market mechanism to operate efficiently met in developing countries, and if not, what is the role of planning? The bad experience of planning in Eastern Europe should not blind us to the fact that the market mechanism also suffers grave deficiencies, and that the way forward in most developing countries must be a judicious mix of market capitalism combined with state intervention.[1]

The traditional case for interference with the market mechanism and some degree of planning rests on several grounds, all of which continue to remain valid.

First, given the natural preference of people for present rather than future satisfaction, resources in a free market will tend to be allocated for the production of goods for immediate consumption rather than for building up the means of production, i.e. for the production of capital goods. Left to itself, the operation of the market is likely to lead to a much slower pace of development and a much lower level of future welfare than if resources, via some form of interference with the market mechanism, can be diverted to the production of capital goods.

Second, as we shall see later, market prices may provide a very imperfect guide to the social optimum allocation of resources because they do not reflect the opportunity cost or value to society of the use of factors of production or the production of certain commodities. A perpetual shortage of capital and foreign exchange, and a surplus of labour, at existing market prices is *prima facie* evidence of structural disequilibrium and a very imperfect market system which may not operate to the benefit of society at large.

Third, because of externalities, many projects that developing countries need, and which would be profitable to society, may not appear profitable under a pure market system in which all investment decisions are left to private individuals. The level of investment may fall below the social optimum first because private investors ignore the external economies and supplementary benefits of projects in calculating prospective returns, and second because the element of risk will be higher for a series of unco-ordinated individual projects than for a co-ordinated investment programme systematically undertaken through some central direction. A further disadvantage of the market mechanism is that by itself it is unlikely to produce the rapid structural changes which development requires. There is no guarantee in a free-market setting that the supply of 'development' goods and factors of production will be forthcoming in the quantities required. Supply may be completely price inelastic, in which case there is little alternative to the public provision of the goods or factors in question. The market mechanism as an efficient allocative device assumes that resources are mobile and producers and owners of factors of production respond to incentives and strive to maximise gains. Part of the reason for bottlenecks and supply inelasticities may be that this assumption does not always hold good in the context of backward economies.

For a variety of reasons, therefore, it is argued that interference with the market mechanism is a necessary prerequisite of a more rapid pace of development. The belief of those that advocate some form of planning or central direction is that positive action of this type will help to achieve more expeditiously and more reliably the goals that developing countries set themselves. The overriding object of a planned development programme is to incorporate society's choice of goals and to allocate resources to meet these goals. The vital question, to which there is no easy answer, is, what form should planning take? Should the market mechanism be superseded altogether, and the state assume total responsibility for resource allocation? Or should planning take place within the framework of the market mechanism with market prices adjusted to reflect social values, and with taxes and subsidies to eliminate divergences between private and social costs and benefits? In short, should a command economy be established, or should the government merely give incentives, and tax to provide certain goods and services itself? Moreover, who should decide on the weight to be given to the choice between present and future consumption, between labour- and capital-intensive technology, and between goods and services and leisure? Should the state be authoritarian in the interests of future generations, or should the government submit to the will of the present generation? No objective economic answer exists to these questions. In the final analysis they must be decided politically. It is the political system and the ideology of those in power that ultimately determine the type of economic organisation.

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[1] For a comprehensive discussion of the role of the State in economic affairs, see Crabtree and Thirlwall (1993).

Whatever form interference with the market mechanism takes, however, it will inevitably involve some degree of state intervention and control over the means of production, distribution and exchange, and the partial replacement of the market mechanism. But it should be remembered that planning is not incompatible with the use of the price mechanism. The abandonment of the market mechanism need not necessarily involve dispensing with the use of prices for resource allocation. The abandonment of the market mechanism merely involves replacing one set of decision-makers with another. But planners can, and do, use prices (or profits determined by prices) as an aid to decision-making. Price movements can still be used as signals for resource allocation even in a totally planned economy in which there is no private ownership. The success of planning depends crucially on the existence of an ample supply of able and technically qualified administrators who are committed to development and not to the furtherance of a political ideology at all costs or to their own aggrandisement. The dangers of planning are that unqualified and corrupt administrators will assume responsibility for resource allocation and perform 'worse' than the market mechanism, and that goals will be set which far exceed the country's capacity to achieve them, leading to widespread disillusion with the planning process. One attraction of the market mechanism, which classical economists continually emphasised, is that it decentralises decision-making and, if it functions smoothly, can stimulate efficiency and growth without any elaborate administrative apparatus. Those who see dangers in assigning decision-making to possibly inexperienced and inept administrators may well accord with Adam Smith's view that 'governments are rarely more effective than when they are negative'.

It is fashionable now to defend the market mechanism for resource allocation on these traditional 'classical' grounds. It is argued that if the market does not function properly in the interests of society, there is a stronger case for making the market more perfect, and for improving its functioning, than there is for planning. Market imperfections and price distortions, in particular, are not themselves arguments for planning, but rather arguments for ensuring that the price mechanism functions better. There is, perhaps, a stronger case for planning in the event of market failure, due to divergences between private and social costs and benefits, but even here market prices can be brought more into line with opportunity costs through policies to promote competition, and subsidies could be given to private producers in cases where the private return from socially desirable projects falls short of the social return. The problem is more intractable if producers and factors of production do not respond to incentives, but defenders of the market mechanism would question whether producers and workers in developing countries do have the aversion to risk-taking and effort that is sometimes supposed.

But in reality, of course, the choice for the vast majority of countries is not between complete *laissez-faire* and total state planning of the means of production, but rather: what combination of private and public enterprise; to what extent should the public sector be extended; to what extent should there be interference with private decision-making; to what degree should the private sector be integrated into a national development plan? These are the questions on which most developing countries must reach decisions.

■ Development Plans

Whatever a country's political ideology, a development plan is an ideal way for a government to set out its development objectives and to demonstrate initiative in tackling the country's development problems. A development plan can serve as a stimulant to effort throughout the country, and also act as a catalyst for foreign investment and agency capital from international institutions.

Depending on the politics of a country, and its available expertise, a development plan will vary in its ambitiousness from a mere statement of aims and pious hopes to detailed calculations (and proposals for action) of the resources needed, and the amount of output that each sector of the economy must generate, in order to achieve a stipulated rate of growth of output or *per capita* income.[1] Anything more than a statement of aims inevitably involves some form of model-building, if only to delineate the relationships between sectors of the economy and between the key variables in the growth process.

Four basic types of model are typically used in development planning. First, there are **macro or aggregate models** of the economy which may either be of the simple Harrod–Domar type, or of a more econometric nature, consisting of a series of n equations in n unknown variables which represent the basic structural relations in an economy between, say, factor inputs and product outputs, saving and income, imports and expenditure, etc. Second, there are **sector models** which isolate the major sectors of an economy and give the structural relations within each sector, and perhaps also specify the interrelationships between sectors, e.g. between agriculture and industry, between capital and consumer-goods industries, and between the government and the rest of the economy. Third, there are **inter-industry models** which show transactions and interrelationships between producing sectors of an economy, normally in the form of an input–output matrix. Finally there are models and techniques for **project appraisal** and the allocation of resources between industries.

Models of these types serve a twofold purpose. In the first place they enable planners to reach decisions on how to achieve specified goals. They highlight the strategic choices open to the policymaker in the knowledge that not all desirable goals are achievable simultaneously. Only with an understanding of the interrelationships between different parts of the economy, and a knowledge of the parameters of the economic system, is it possible for meaningful and consistent policy decisions to be reached. Without detailed information on which to base planning (or what has been called 'planning without facts'), the case for decentralised decision-making becomes overwhelming. Second, models of the type described above can perform an equally valuable function from the point of view of enabling the future to be projected with a greater degree of certainty than would otherwise be possible, thereby providing some knowledge of what resources are likely to be available in relation to requirements within a stipulated planning period. Various types of model may be classified, therefore, according to whether they are required for policy or decision purposes or for the purpose of projection and forecasting. The necessary constituents of a plan containing both types of model are a statement of economic goals; the specification of policy instruments or instrumental variables; the estimation of structural relationships; the availability of historical data; the recognition of exogenous variables; and last, but not least, a set of national accounts for national income and expenditure, foreign trade and even manpower to ensure consistency between demand and the supply of resources available.

■ Policy Models

The essence of a policy model is that a certain set of objectives is specified and the model is then used to determine the most appropriate measures to achieve those objectives within certain constraints. In most development plans the primary objective is the achievement of a target rate of growth of output or *per capita* income within the planning period, or some terminal level of consumption, subject to constraints on the composition of output, the distribution of income and the availability of factor supplies. Given the time horizon of the plan, and the objective function, the optimum strategy can be worked out from the initial conditions. One of the big dangers of planning in developing countries is that planners and policy-makers are prone to choose targets based on needs and aspirations rather than on the basis of available resources, with the inevitable consequence that the targets are not achieved. It is incumbent on the planner to specify the constraints as accurately and honestly as possible to avoid disillusion with the planning process.

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[1] Students should familiarise themselves with a plan for a country of their choosing. Almost all developing countries have one.

The solution to a policy model of this kind is somewhat different from one designed to find the value of certain instrumental variables that will achieve a particular target rate of growth. The difference can be illustrated with reference to the simple Harrod model of growth which gives the level of savings necessary to achieve a particular growth rate assuming some value of the capital–output ratio. The level of savings required to achieve a target rate of growth may be very different from the level of savings available when the problem is posed as one of maximising growth subject to constraints. The level of savings necessary to achieve the target rate of growth may conflict with society's wish for present rather than future consumption; it may be incompatible with the supplies of skilled labour necessary to work with capital, and the level of savings may not even be achievable because of a limit to the capacity to tax or to 'force' saving through inflation.

It is clear from what we have said so far that the first step in the formulation of a policy model must be the construction of an aggregate model of the economy (incorporating, if need be, a sector model and an inter-industry model) to highlight and check the implications of the target rate of growth. If it is possible to formulate a reasonably sound set of structural equations for the economy, this exercise should not be too difficult.

The structural relationships given by the structural equations are the restrictions on the instrumental variables which the policy-makers must consider as datum. They represent, as we have said already, such things as technological relationships in industry, income–consumption relationships, foreign-trade relationships and other behavioural and institutional relationships which, in the short run at any rate, are outside the sphere of the policy-maker to influence. In the long run, certain structural relations may of course change with changes in the economy induced by the planning process itself. The capital–output ratio, for example, may change under the influence of education expansion and the development of a country's infrastructure. Other, more basic, structural relationships, however, must be contended with in the planning process, even in the long run. Some of the important questions that need to be answered with the help of the structural equations are: Can capital be guaranteed in the quantities required? Will exports and foreign assistance keep pace with the imports required? Will the future demand for consumption goods, out of increases in *per capita* income, exceed the supply and cause inflation? Can the required inter-relationships between industries be maintained so that bottlenecks do not arise? If the objective function or goals of a plan require a certain degree of balance between supply and demand in various markets and sectors of the economy, then clearly the objective function must be maximised subject to this general requirement of avoiding shortages of capital, labour and foreign exchange. The basic structural relationships required can be found or determined by drawing on economic theory and econometric research, or by intuitive 'feel' in the case of behavioural and institutional relationships.

Next, the instrumental variables must be specified. These are the variables that the planners intend to influence in some way in order to achieve the objectives specified within the constraints laid down. If the basic objective is a higher rate of growth, one obvious instrumental variable is the level of savings and investment in relation to national income. This can be influenced by tax policy, inflation and assistance from abroad. If the structural relationships are given, and the constraints are outlined, a solution to a policy model will give a set of values for the instrumental variables that satisfies all the structural (and behavioural) equations in the model consistent with the constraints imposed. In the case of savings, for example, the solution to a policy model would give the level of saving possible compatible with balance between the agricultural and industrial sectors of the economy, foreign borrowing of no more than a certain amount, consumers' desires for present rather than future consumption, and so on.

It should be emphasised at this point that the planners ought not to lay down rigid policy prescriptions for more than a very short length of time. Planning itself may alter circumstances in the future in an unforeseen way and planners must be ready to adapt to the new situation. The means by which to achieve plan goals must be flexible, and so too must the planning period. The term 'rolling plan' is used to describe planning of a flexible nature where plans are continually being reviewed and revised in the light of new developments. If plans need to be revised, however, it is important that they are modified cautiously to avoid erosion of confidence. One of the purposes of planning is to imbue confidence, especially among the private decision-making class who are most susceptible to uncertainty, and it is vital that this confidence is not upset and uncertainty increased by sudden changes in policy. There are three typical planning horizons: one-year plans corresponding to a normal budget and accounting period; medium-term plans stretching over four to seven years; and ten- to twenty-year plans (which is probably the maximum length of time for which it is possible to make meaningful projections).

Because of computational limitations, separate decision models will probably have to be constructed for distinct policy purposes, e.g. the choice of techniques, the structure of trade, the pattern of final demand, the allocation of resources, etc. The application of aggregate macro models based on interconnections between income, consumption, investment, employment and foreign trade, etc., is also likely to run into the problem of sectoral differences in structural relationships such that if the structure or pattern of production changes over time within the plan period, the use of average structural coefficients may give rise to misleading results. This is where sectoral models become important. If the economy can be conveniently divided into two or three sectors, the average coefficients can be adjusted for expected changes in the expansion or contraction of the different sectors over the period of the plan. Ultimately, any macro model must be consistent with the models and predictions for various sectors of the total economy.

Despite the potential use of decision models, they are not so widely used as might be expected in developing countries, especially decision models which attempt to optimise one thing or another. In practice, planning tends to be much more *ad hoc*. The reason is very often the difficulty in arriving at agreement over the objective function. It is extremely difficult to balance the conflicting aims of different parts of the community and to reach a consensus over conflicting economic objectives.

■ Projection Models

Any of the first three of the basic types of model mentioned at the outset may be used for projection or forecasting purposes. Typically, aggregate models for projection are of the Harrod–Domar type and are used to indicate the amount of capital required in the future, either to achieve a particular target rate of growth or to keep the labour force fully employed (or both), assuming the labour force is exogenously determined. Sector models, on the other hand, are designed to project the output of various sectors and, if balanced growth is required, to allocate resources accordingly. Last, inter-industry models are designed to estimate the output requirements of industries as a result of a projection of expansion of the final demand for goods and services over a future period of time (see Chapter 11).

It would be wrong, of course, to think of forecasting models as entirely distinct and divorced from decision models. Forecasting models, especially of the econometric type, are often used, and are designed to be used, as decision models, with current choices and decisions depending on the future the models portray. Indeed, there is little use for *pure* forecasting models as such without using them as a guide to policy.

The Allocation of Resources: The Broad Policy Choices

Given the scarcity of resources in developing countries in relation to development needs, one of the central issues in development economics is the allocation of resources among competing ends. For most developing countries the two major constraints on the growth of output are the ability to invest and import, and most theories of resource allocation and most investment criteria reflect this fact. A common starting-point in the consideration of resource allocation is how to maximise the level or growth of output from the domestic resources available, and how to minimise the use of foreign exchange.

Apart from the decision of how much to invest, three broad types of allocation decision may be distinguished: first, there is the question of which sectors to invest in; second, there is the question of which projects should receive priority given the factor endowments of a country and its development goals; and third, there is the question of the combination of factors that should be used to produce a given vector of goods and services which will determine the technology of production. While these decisions may look independent, in fact they are not. In practice, interdependence between decisions on output and decisions on technology is inevitable. The decision on which goods to produce will, to a certain extent, dictate factor proportions if technical coefficients are relatively fixed, and decisions about technology are bound to influence the types of goods and services that are produced, in so far as factor proportions cannot be varied. Some goods and services are obviously more labour intensive than others. The choice of technology, in turn, will be particularly influenced by the way in which resources are valued, and by the relative valuation given to present versus future consumption and welfare.

Because of the interdependence between the choice of goods and the choice of technology, a country which decides to use relatively labour-intensive techniques within the framework of goods chosen may none the less have a greater capital intensity than another country using relatively capital-intensive techniques with a different mix of goods. In discussing resource allocation and the choice of techniques a sharp distinction needs to be made between investment criteria which relate to the pattern of output on the one hand and the choice of technology to produce the given vector of outputs on the other.

Investment decisions of the micro type outlined above will also be influenced to a certain degree by the nature of the development strategy intended; that is, by the broader policy issues such as whether emphasis is to be given to agriculture or industry, whether resources are to be used to build up complementary activities or whether imbalances are to be deliberately created in order to induce investment and decision-making, and whether emphasis is to be on static short-term efficiency in the allocation of resources or whether emphasis is to be on laying the foundations for faster growth in the future. And in an open economy, the potential clash between efficiency and growth also requires a consideration of the implications of adherence to different versions of the comparative cost doctrine. In short, the question of resource allocation between projects cannot be divorced from consideration of the wider policy issues of industry versus agriculture, balanced versus unbalanced growth, foreign trade strategy, etc. And influencing all these decisions will be the underlying objectives of the development strategy: whether the aim is to maximise current welfare or to maximise consumption at some future point in time.

The choice of development strategy itself will be subject to political, social and economic constraints. A particular strategy, for example, may conflict with the desired income distribution or other social objectives. Other strategies may involve political repercussions inimical to development. One factor that cannot be ignored is the regional distribution of political power. Spatial considerations of this sort add a further dimension to the allocation problem. The pursuit of balanced growth or massive investment in social-overhead capital may imply a large public sector in the economy which may not be politically tolerable. Certain development plans may antagonise foreign investors or multilateral aid-giving agencies such that if the plans are carried out foreign capital or 'agency' capital dries up. Bearing in mind these constraints, let us consider first some of the broader aspects of development strategy, and discuss briefly development goals, before examining a number of specific investment criteria that have been recommended for determining the allocation of resources and the pattern of output.

■ Industry *vs* Agriculture

The issue of the choice between industry and agriculture, and where the emphasis should lie, can be discussed very quickly because, as we saw in Chapter 3, the two sectors are very much complementary to each other. In practice the fortunes of agriculture and industry are closely interwoven in that the expansion of industry depends to a large extent on improvements in agricultural productivity, and improvements in agricultural productivity depend on adequate supplies of industrial 'inputs', especially the provision of consumer goods to act as incentives to peasant farmers to increase the agricultural surplus. It is worth mentioning, however, that the emphasis on *balance* between industry and agriculture is of fairly recent origin. On the one hand it represents a shift of emphasis away from the 'modern' view of an all-out drive for industrialisation by developing countries, and at the same time it represents a reaction against the traditional doctrine of comparative cost advantage which, when applied to developing countries, almost certainly dictates the production of primary commodities, and a pattern of trade which puts these countries at a relative development disadvantage.

■ The Comparative Cost Doctrine

Whether the comparative cost doctrine should be adhered to is itself a question of development strategy which is intimately bound up with the goals of developing countries (i.e. what they are trying to maximise), and with the controversy over whether trade should be looked at more from the point of view of the balance of payments than from that of the allocation of real resources. Assuming the full employment of resources, and that the price of a commodity reflects its opportunity cost (admittedly bold assumptions in any country), adherence to the comparative cost doctrine will produce the optimum pattern of production and trade for a country (see Chapter 15). Efficiency will be maximised when no commodity is produced which could be imported at a lower cost measured by the resources that would have to be sacrificed to produce it at home. In a free-trade world this would almost certainly rule out the production of a wide range of industrial commodities in developing countries. If the objective is growth, however, as opposed to static efficiency, the theory of growth suggests investment criteria that are quite different to those derived from the theory of comparative advantage. If growth depends on increases in *per capita* investment, for example, it may be unwise to channel resources into activities which are labour intensive, where the income generated is all consumed and none is saved, or where there is no scope for increasing returns. Similarly, if growth is constrained by the balance of payments, it may be equally misplaced to develop activities producing goods with a low price and income elasticity of demand in world markets. A low price elasticity of demand can cause fluctuations in export earnings with shifts in supply and cause the terms of trade to move adversely. A low income elasticity of demand will mean that for any given growth of world income countries producing these commodities will be put at a permanent balance-of-payments disadvantage compared with other countries producing goods with a higher income elasticity of demand.

The question ultimately boils down to one of the relative valuation of present versus future out-

Table 7.1 ***Consumption Benefits with Different Investment Ratios Over Different Planning Horizons***

Time	*Policy 1 (no investment)*				*Policy 2 (10 per cent investment)*				*Policy 3 (50 per cent investment)*			
	K	*Y*	*I*	*C*	*K*	*Y*	*I*	*C*	*K*	*Y*	*I*	*C*
1	200	100	0	100	200.00	100.00	10.00	90.00	200.00	100.00	50.00	50.00
2	200	100	0	100	210.00	105.00	10.50	94.50	250.00	125.00	62.50	62.50
3	200	100	0	100	220.50	110.25	11.03	99.22	312.50	156.25	78.12	78.12
4	200	100	0	100	231.53	115.76	11.57	104.19	390.62	195.31	97.65	97.65
5	200	100	0	100	243.10	121.55	12.15	109.40	488.27	244.13	122.07	122.07
6	200	100	0	100	255.25	127.62	12.76	114.86	610.34	305.17	152.58	152.58
7	200	100	0	100	268.01	134.00	13.40	120.60	762.92	381.46	190.73	190.73
8	200	100	0	100	281.41	140.70	14.07	126.61	953.65	476.82	238.41	238.41
9	200	100	0	100	295.48	147.74	14.77	132.97	1192.06	596.03	298.01	298.01
10	200	100	0	100	310.25	155.12	15.51	139.61	1490.07	745.03	372.51	372.51

Key: *K* is the capital stock; *Y* is output; *I* is the level of investment; and *C* is consumption.

put and consumption (or welfare) – between consumption today and consumption tomorrow. Efficiency in resource allocation will maximise present output and consumption from a given amount of resources, but may impair growth and future consumption. Striving for growth may lower present welfare but will provide greater output in the future.

■ Present *vs* Future Consumption

The choice between present and future consumption is the same as the choice between consumption and investment in the present. How much investment should be undertaken in the present depends on the time interval over which society wants to maximise consumption and what value it places on consumption in the future compared with consumption in the present; that is, on the rate at which it discounts future consumption gains. Time affects both the accumulation of consumption gains and the effect that discounting has. Investment should take place so as to maximise consumption over the planning period. The investment ratio which maximises consumption will vary according to the planning period, with and without discounting. Let us illustrate with a numerical example. Consider three different investment ratios of 0, 10 and 50 per cent, and three different planning periods of three, six and ten years. Further assume that the capital–output ratio is 2, and that, for simplicity, there is no depreciation and no discounting. Let the initial capital stock equal 200, producing 100 units of output. The time paths of output, consumption, investment and the capital stock for the three different investment strategies and three different planning horizons can now be shown, as in **Table 7.1.** Over the three-year planning period, the first policy of no investment maximises consumption. Over the six-year planning period, the second policy of a 10 per cent investment ratio maximises consumption, and over the ten-year planning period the third policy of a 50 per cent investment ratio maximises consumption.

The calculations in **Table 7.1**, and the conclusions drawn from them about the time period over which consumption will be maximised, will be affected by discounting, and the discount rate chosen, because the present value of future consumption gains are worth less and less the further into the future they accrue, and their value is also less the higher the discount rate chosen. What we illustrate, then, is that the answer to the question of how much to invest depends crucially on the planning horizon taken and the discount rate chosen. The longer the planning horizon, and the less the stream of future consumption benefits is discounted, the more investment. The shorter the planning horizon taken, and the higher the discount rate, the less investment there will be.

We also illustrate that countries with low initial stocks of capital and low levels of consumption must invest heavily if high future living standards are to be attained. But to invest heavily they must take long planning horizons. One of the arguments for planning is, in fact, to lengthen the planning horizon beyond that chosen by individuals maximising privately. Any finite planning horizon, however, only takes care of the people living within the planning period. To take account of generations living beyond the horizon, certain constraints must be built into the investment model such that, for example, the level of consumption at the end of the period should not be above a specified level, otherwise maximisation of consumption within the horizon would mean consuming all income at the end of the horizon leaving no saving for future investment and consumption.

■ Choice of Techniques

In a planning framework, the valuation of present versus future welfare is also the central issue regarding the choice of technology – whether techniques should be capital- or labour-intensive. At first sight it would seem sensible, in a labour-abundant economy, to use labour-intensive techniques of production, and to encourage activities that use factors of production which are in abundance. Doing so, however, may lead to a conflict between efficiency and growth; a clash between the maximisation of present consumption and the level of consumption in the future. The problem is that if the wage rate is given, and invariant with respect to the technique of production, the more labour-intensive the technique the less saving that is likely to be generated for future reinvestment. Specifically, if the propensity to consume of the workers is higher than that of the owners of capital, the total surplus, and the surplus per unit of capital invested, left for reinvestment will be smaller than if the technology were more capital-intensive. On the other hand, the more capital-intensive the technology, the lower the level of consumption and employment in the present.[1]

In general, we reach the conclusion that the higher the valuation placed on raising the present level of employment and consumption as compared to future output, the more labour-intensive techniques should be favoured. On the other hand, the greater the valuation placed on future output in relation to present welfare, the more capital-intensive methods of production should be favoured. It is capital-intensive techniques that are capable of yielding the largest surplus of income over wage costs for a given capital outlay, making possible a higher rate of reinvestment for the future. The choice between projects of different degrees of capital intensity, therefore – in so far as there is a choice – boils down to the relative weights to be attached to an additional increment of investment compared to an additional increment of consumption. If saving is regarded as 'sub-optimal', then at the margin an extra unit of investment must be regarded as more valuable than an extra unit of consumption and there is a case for more capital-intensive techniques which will generate this extra investment potential at the margin. As we said earlier in Chapter 3, the fact that the social opportunity cost of labour is zero makes no difference to the argument because even 'costless' labour will consume if employed in industry, and the object is to minimise consumption. As long as the wage in industry is higher than the marginal product in alternative uses, there will be an increase in consumption with the employment of more labour in industry. This has important implications for the valuation of labour in resource allocation, which we take up when we discuss social cost–benefit analysis and shadow wages in Chapter 8.

There is not only a potential conflict between employment and saving in the choice of techniques but also a conflict between employment and output. The conflict arises not in the utilisation of existing equipment but in the choice of *new* techniques. Techniques of production which are labour-intensive may have higher capital–output ratios than techniques which are more capital-intensive. A simple example will illustrate the point. Assume a fixed amount of capital to be invested of £1000. One technique of production could employ 100 units of labour with £1000 of capital, but the capital–output ratio is 5. This would give an output of 200 with the employment of 100 men. A second technique of production employs 50 units of labour but has a capital–output ratio of 4. This would give an output of 250 with employment of 50 men. Thus maximising both the current level of employment and output are only consistent if the more labour-intensive techniques also have the lowest capital–output ratios. We discuss these conflicts more fully, and the choice of techniques in practice, in Chapter 10.

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[1] This conclusion depends, among other things, on the wage rate being invariant with respect to the technique of production. If the wage is higher the more capital-intensive the technique, this conclusion would have to be modified. For a discussion of this point, and other considerations which may lessen the conflict between employment and saving in the choice of techniques, see Chapter 10.

Balanced *vs* Unbalanced Growth

Another broad choice of development strategy is between so-called balanced and unbalanced growth. Whether or not there exists a low-level equilibrium trap, which needs a 'critical minimum effort' to overcome it, sound economic reasons can be advanced in support of a 'big push', taking the form of a planned large-scale expansion of a wide range of economic activities. The economic rationale for a 'big push' forms part of what has come to be known as the doctrine of **balanced growth**. Opposed to this thesis, however, is a school of thought which argues that a 'big push' is not feasible, and that in any case development is best stimulated in developing countries by the deliberate creation of imbalance. In this respect balanced versus unbalanced growth is an issue of development strategy which may constrain the application of investment criteria.

The term 'balanced growth' is used in many different senses, but the original exponents of the balanced growth doctrine had in mind the scale of investment necessary to overcome indivisibilities on both the supply and demand side of the development process (see, for example, Rosenstein-Rodan (1943)). Indivisibilities on the supply side refer to the 'lumpiness' of capital (especially social-overhead capital), and the fact that only investment in a large number of activities simultaneously can take advantage of various external economies of scale. Indivisibilities on the demand side refer to the limitations imposed by the size of the market on the profitability, and hence feasibility, of economic activities. This was the original interpretation of the doctrine of balanced growth: the large-scale expansion of activities to overcome divergencies between the private and social return.

The doctrine has since been extended, however, to refer to the *path* of economic development, and the *pattern* of investment, necessary to keep the different sectors of the economy in balance so that lack of development in one sector does not impede development in others. This does not mean, of course, that output in all sectors should grow at the same rate, but rather in accordance with the income elasticity of demand for products so that supply equals demand. The notion of equilibrium is implied, and an absence of shortages and bottlenecks. A definition of balanced growth embracing the several different interpretations and emphases that have been placed on the term has been attempted by Paul Streeten (1959): 'Wherever several non-infinitesimal investment decisions (or decisions generally) depend for their success on each other, simultaneous investment in a series of industries (or firms or plants), in conformity with the pattern of consumers' demand and of different industries' demand for each other's products, is required.' Balanced growth, therefore, has a horizontal and vertical aspect. On the one hand it recognises indivisibilities in supply and complementarities of demand, and on the other it stresses the importance of achieving balance between such sectors as agriculture and industry, between the capital-goods and consumer-goods industries, and between social capital and directly productive activities.

Thus there are two fairly distinct versions of the balanced growth doctrine that need considering: one referring to the path of development and the pattern of investment necessary for the smooth functioning of the economy, and the other referring to the scale of investment necessary to overcome indivisibilities in the productive process on both sides of the market. Nurkse's views (1953) on balanced growth tend to embrace both versions of the theory of balanced growth, while Rosenstein-Rodan concentrates on the necessity for a 'big push' to overcome the existence of indivisibilities. We shall first consider the economic arguments for a large-scale investment programme and then discuss the desirability of achieving balance between different sectors of the economy.

On the demand side, the argument amounts to little more than Adam Smith's famous dictum that specialisation, or the division of labour, is limited by the extent of the market, and that if the market is limited certain activities may not be economically viable. If, however, several activities are established simultaneously, each could provide a market for each other's products, so that activities that are not profitable considered in isolation would become profitable considered in the context of a large-scale development programme. The onus would presumably be on the government to organise such a programme, and planning would supersede the market system for the programme to be initiated. It is true that industrial enterprises may have to be of a certain minimum size to be profitable, if only to compete in international markets, but the argument begs certain questions and leaves others unanswered. For example, there may be latent demand for certain commodities which would obviate the need to establish other activities to generate the income and purchasing power necessary for those commodities to be bought.[1] Moreover, there are several alternative ways in which markets can be widened. The improvement of transport facilities in developing countries, and of communications in general, offers tremendous scope for the expansion of markets. Also the doctrine of balanced growth for demand reasons may lose much of its force in the context of an open economy. Restrictions on imported commodities could immediately expand the market for home-produced substitutes, and export promotion can also be resorted to. No one would deny that there are development difficulties connected with a limited home market for commodities, but a 'big push' is not the only way, and not necessarily the most expeditious or economical, in which these difficulties can be overcome.

On the supply side, the argument for a 'big push' is bound up with the assumed existence of **external economies of scale**. The external economies referred to in this context go beyond the external economies of the traditional theory of the firm. Whereas in traditional equilibrium theory external economies refer to the fact that the nature of the production function in one activity may be altered by the existence of other activities (e.g. those in close proximity), in the context of development theory they refer mainly to the impact of a large investment programme on the profit functions of participating firms. If there exist external economies in either sense, the social return of an activity will exceed the private return. It is argued that the way to eliminate this divergence is to make each activity part of an overall programme of investment expansion. Enterprises which are not, or do not appear to be, profitable in isolation become profitable when considered as part of a comprehensive plan for industrial expansion embracing several activities. As several commentators have pointed out (e.g. Fleming (1955)), however, while the expansion of several activities may improve the profitability of each activity – assuming there are inter-industry linkages – the cost of factor inputs may rise, offsetting the benefit of these external economies. Under the impact of a 'big push' the price of capital goods and the cost of capital may rise substantially, and so too may the wage rate. If factors of production are not in elastic supply, the case for a 'big push' to eliminate discrepancies between the private and social returns of an activity is weakened – at least it would be a question of weighing the benefits of the external economies against the increased cost of factor inputs. One advantage of gradual expansion as opposed to a 'big push' is that the supply of factors would have some time to adjust to the increased demand.

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[1] It is for this reason that the example of the shoe factory has always seemed to me to be singularly inappropriate for illustrating the problem posed by a limited market; the proposition being that a shoe factory would never be viable unless it was part of a large investment package since shoe workers will want to spend their income on commodities other than shoes. Unless an economy is totally devoid of other activities, there should be enough people working elsewhere to justify at least one isolated shoe factory!

It was in the light of these demand and supply considerations, however, that Rosenstein-Rodan in his pioneer article recommended a massive investment programme for the industrialisation of East and South-East Europe extending over a ten-year period. His idea was for an Eastern European Industrial Trust to be established to instigate a 'big push' sufficient to absorb ten million workers regarded as surplus in the agricultural sector. Calculating on the basis that each worker would require between £300 and £350 of capital, he estimated that the investment ratio would have to be raised to 18 per cent of national product for the ten-year period, or double its prevailing level. Rosenstein-Rodan was not optimistic that this could be achieved, and it is true to say that in the case of the present developing countries there are few today who believe that a 'big push' is feasible, even if desirable. The prevailing view would seem to be that if developing countries do possess the resources for a 'big push', they ought hardly to be described as developing in the first place.

The fact remains, however, that certain investments must be of a minimum size to be economically worthwhile. It may be uneconomical to build roads, railways and power stations merely to meet current demand. Ideally, social-overhead capital of this type must be planned and built on a large scale to achieve long-run economy in the use of resources. But this argument hardly qualifies for the special label 'balanced growth'. The case for a 'big push' for supply reasons seems to be quite weak in the absence of resources to attempt such a strategy and without detailed knowledge of the precise magnitude of the net economies that are likely to accrue.

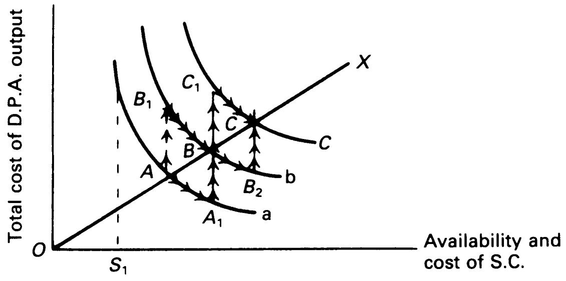
We turn very briefly, therefore, to the second version of the balanced growth doctrine which lays emphasis on the path of development and the pattern of investment. This version of the balanced growth doctrine stresses the necessity of balance between sectors of the economy to prevent bottlenecks developing in some sectors, which may be a hindrance to development, and excess capacity in others, which would be wasteful. Among the foremost proponents of this version of the balanced growth doctrine are Nurkse (1953) and Professor Arthur Lewis (1955). Particular emphasis is placed by these two economists on achieving a balance between the agricultural and industrial sectors of developing economies. This is for two main reasons, both of which recognise the interdependence between the two sectors and the mutual assistance and stimulus that each can give the other. The first is that if agricultural productivity is to improve, there must be incentives for farmers to expand their marketable surplus, and this requires a balance between the agricultural and consumer-goods sectors of the economy. The second is that agriculture requires capital inputs and this requires a balance between agriculture and the production of capital goods and the provision of social-overhead capital. This is in addition to the fact that agricultural output can provide a basis for the development of local industries and that the industrial sector relies on the agricultural sector for food. Furthermore, in the absence of increasing exports the agricultural sector must rely on the industrial sector for a substantial proportion of the increased demand for its products. The doctrine of balanced growth in this form, especially the stress on the balance between agriculture and industry, steers a middle course between the traditional comparative cost doctrine that developing countries should confine themselves to the production of primary commodities, and the view that developing countries ought to industrialise as intensively and quickly as possible.

■ Unbalanced Growth

A major criticism of the balanced growth doctrine is that it fails to come to grips with one of the fundamental obstacles to development in developing countries, namely a shortage of resources of all kinds. Critics of balanced growth do not deny the importance of a large-scale investment programme and the expansion of complementary activities. Their argument is that in the absence of sufficient resources, especially capital, entrepreneurs and decision-makers, the striving for balanced growth may not provide a sufficient stimulus to the spontaneous mobilisation of resources or the inducement to invest, and will certainly not economise on decision-taking if planning is required.

One of the most provocative books on development strategy is by Professor Hirschman (1958), whose argument is along these lines. Hirschman was then the foremost exponent of the doctrine of **unbalanced growth** and we must briefly consider his views. The question he attempts to answer is this: given a limited amount of investment resources, and a series of proposed investment projects whose total cost exceeds the available resources, how do we pick out the projects that will make the greatest contribution to development relative to their cost? And how should 'contribution' be measured? First of all, he distinguishes two types of investment choices – substitution choices and postponement choices. Substitution choices are those which involve a decision as to whether project A or B should be undertaken. Postponement choices are those which involve a decision as to the sequence of projects A and B, i.e. which should precede the other. Hirschman is mainly concerned with postponement choices and how they are made. His fundamental thesis is that the question of priority must be resolved on the basis of a comparative appraisal of the strength with which progress in one area will induce progress in another. The efficient sequence of projects will necessarily vary from region to region and from country to country depending on the nature of the obstacles to development, but the basic case for the approach remains the same; .that is, to economise on decision-making. In Hirschman's view, the real scarcity in developing countries is not the resources themselves but the means and ability to bring them into play. Preference should be given to that sequence of projects which maximises **'induced' decision making.**

Figure 7.1



He illustrates his argument by considering the relation between social capital (SC) and directly productive activities (DPA). The case in which SC precedes DPA he calls 'development via excess capacity', and the case in which DPA precedes SC he labels 'development via shortages'. Both sequences create inducements and pressures conducive to development; but which sequence should be adopted, if it is not possible to pursue a 'balanced' growth path, to produce DPA output at minimum cost in terms of inputs into both DPA and SC? The question can be made clearer with the aid of a diagram (**Figure 7.1**).

If the total cost of DPA output is measured on the vertical axis, and the availability and cost of SC is measured on the horizontal axis, curves can be drawn (*a*, *b*, *c*) showing the cost of producing a given full-capacity output of DPA, from a given amount of investment in DPA, as a function of the availability of SC. Successive curves, *a*, *b*, *c*, represent different levels of DPA output from successively higher investment in DPA. The curves are negatively sloped and convex to the origin because DPA costs will decrease the greater the availability of social capital, but there is a minimum amount of SC necessary for any level of DPA output (e.g. OS_1 corresponding to curve *a*), and as SC increases its impact on the cost of DPA output becomes less and less.

Now assume that the objective of the economy is to obtain increasing outputs of DPA with the minimum use of resources devoted to both DPA and SC. On each curve, *a*, *b*, *c*, the point where the sum of the co-ordinates is smallest will represent the most desirable combination of DPA and SC on this criterion. The line OX connects the optimal points on the different curves and this represents the most 'efficient' expansion path, or 'balanced' growth path, between SC and DPA.

But suppose that 'optimal' amounts of SC and DPA cannot be expanded simultaneously to keep in balance with one another. On what criteria is that postponement choice made? One possibility is the sequence AA_1BB_2C where the initial expansionary step is always taken by social capital. This is the sequence that is called 'development via excess capacity'. The other (opposite) possibility is the sequence AB_1BC_1C where the initial expansionary step is taken by DPA. This is the sequence that is called 'development via shortages'. According to Hirschman, the preference should go to the sequence of expansion that maximises 'induced' decision-making. It is difficult to tell *a priori* which sequence this is likely to be. If SC is expanded, existing DPA becomes less costly, encouraging further DPA. If DPA are expanded first, costs will rise but pressures will arise for SC facilities to be provided. Both sequences set up incentives and pressures and ultimately, in Hirschman's view, the sequence chosen must depend on the relative strength of entrepreneurial motivations on the one hand and on the response to public pressure of the authorities responsible for social capital on the other.

In general, however, Hirschman has some harsh things to say about the traditional view that SC must precede, or even be kept in balance with, DPA if development is to progress smoothly. While he admits that a certain minimum of social capital is a prerequisite to the establishment of DPA, he argues that development via excess capacity is purely permissive, and that to strive for balance is equally dangerous because there will be no incentive to induced investment (or induced decision-making). On the other hand, development via shortages will compel further investment, and hence the most 'efficient' sequence as far as 'induced' decision-making is concerned is likely to be that where DPA precedes SC.

It is true that where there is strong social and economic resistance to change, 'permissive' acts, such as the construction of social-overhead capital, are not likely to provide much impetus to development. Italy discovered this in its attempt to develop the Mezzogiorno, and policy was changed as a result. On the other hand, Hirschman's analysis leaves several questions unanswered. He concedes that the objective must be to obtain increasing outputs of directly productive activities at minimum cost in terms of resources devoted to both DPA and SC, and that the cost of producing any given output of DPA will be higher the more inadequate is SC, but what is the *minimum* amount of SC required in a developing economy? Is this minimum so high as to contradict the argument that DPA should precede SC, at least in the earliest stages of development? Furthermore, what is the guarantee that SC will subsequently be provided once DPA have been established? Indivisibilities with respect to social capital may be so large that private investors are not induced to supply at any price. Reliance would then be on the government. Hirschman neglects to pay adequate attention to the government's crucial responsibility in this connection. It looks suspiciously as if unbalanced growth via shortages, like the 'big push', may not be economically feasible (albeit for different reasons).

Hirschman would apply the same criterion of 'induced decision-making' to the choice and sequence of projects *within* the directly productive sector. Here inducements stem from interdependencies between activities, or what Hirschman calls **'backward' and 'forward' linkage effects.** Backward linkages measure the proportion of an activity's output that represents purchases from other domestic activities. Forward linkages measure the proportion of an activity's output that does not go to meet final demand but is used as inputs into other activities. With knowledge of inter-industry flows in an economy, from an input–output table (see Chapter 11), it should be possible to rank activities according to the magnitude of their combined linkage effects. Hirschman is suggesting that within the directly productive sector a useful development strategy would be to encourage those activities with the potentially highest combined linkages, because this will provide the greatest inducement and incentive to other activities to develop.

Unfortunately, one of the typical characteristics of developing countries is a lack of interdependence between activities. Primary product production has very limited backward linkages with other activities, and forward linkages, although potentially greater, also tend to be small in practice. Agriculture's demands on other sectors are minimal, and only a comparatively small fraction of total agricultural output in developing countries is processed domestically; most is exported. The fact that manufacturing activities possess greater backward and forward linkages, strengthening the cumulative nature of development, is another powerful reason for industrialisation. Hirschman advocates the expansion of industry through the transformation of semi-manufactures into goods required for final demand, or what he calls 'enclave import' industries. In general he lays great stress on the role of imports in the development process seeing imports as part of the inducement mechanism. For not only can semi-manufactured imports be processed into goods for final demand, but final-demand imports themselves can then be readily produced at home once the market has attained a certain size (or production threshold). If one of the major obstacles to development is a shortage of decision-makers, coupled with uncertainty and a limited market, the existence of imports provides conclusive proof that the market is there. As imports increase, so too do the chances that domestic production will one day be profitable. Hirschman criticises developing countries for restricting imports prematurely, and argues that infant industry protection should only be given after imports have reached such a level as to guarantee domestic producers a market for their goods.

Rather like the operation of the price mechanism, Hirschman seems to be arguing for development through a process of 'successive adaptation', with the system itself pointing to the shortages or bottlenecks and overcoming them accordingly. In fact, one of the major appeals of unbalanced growth is that it does not imply the abandonment of the market mechanism. Like the market mechanism, unbalanced growth also decentralises decision-making (as well as economising its use), which may be an advantage in some developing countries which lack an honest and competent administration. While unbalanced growth economises on decision-making, however, decisions must still be taken and the need for managerial ability and administrative expertise is in no way diminished. A further advantage of unbalanced growth, as opposed to balance between sectors, is that there may also be a certain degree of economy in the use of physical resources. If capital is scarce, and indivisibilities do exist, it is probably more economical to produce a few products in optimum-size plants rather than a whole range of products in sub-optimal plants. There may be a trade-off, in other words, between balance and technical efficiency.

The inherent danger of unbalanced growth is that it leaves too much to chance. With the unbalanced growth model one has the uncomfortable feeling that the pace of development rests solely on the whims of entrepreneurs and whether individuals are induced to invest or not. There is little discussion of how to overcome discrepancies between the private and social profitability of development projects, and the possibility of waste and excess capacity through actions being abortive must also be faced. Supposing imbalances are deliberately created, or arise naturally, but supply is totally inelastic, what then? Is the simultaneous existence of excess capacity in some sectors and shortages in others allowed to persist, or is the onus on the public authorities to produce some semblance of co-ordination? The role of shortages in promoting development is probably overrated. At least a distinction needs to be made between types of shortage: those that can be filled by response from the market mechanism and those which cannot, and those which induce expansion of capacity and those which do not. Unbalanced growth may further lead to the concentration of production on one or two commodities, with possible harmful effects on the balance of payments if the goods are price inelastic and income inelastic in demand. Last, imbalances can be a powerful source of inflationary pressure, with cost and price increases emanating from the bottleneck sectors spreading throughout the economy. Methods of controlling this type of inflation, other than by restoring balance, have severe limitations: first, if price controls are imposed, the supply situation may be made worse in the shortage sectors by discouraging production; second, general demand deflation will be wasteful by creating unemployed resources in the non-bottleneck sectors; and third, currency depreciation which may be necessary to maintain a balance of payments is itself inflationary by raising the domestic price of imports. There is evidence that in some South American countries one of the major sources of rising prices is sector inflation coupled with exchange rate depreciation. We shall have more to say about sector inflation in Chapter 13.

It is not easy to evaluate the balanced versus unbalanced growth debate. For one thing, the theories cannot easily be tested empirically, and for another the strategies are politically contentious. From the purely economic point of view, however, there is really no reason at all why balanced and unbalanced growth should be presented as alternatives in the first place. Several attempts have been made, in fact, to present a reconciliatory view, notably by Mathur (1966). One step towards this reconciliatory approach, which both Hirschman and Nurkse mention themselves, is to treat unbalanced growth as a means of achieving the ultimate objective of balanced growth. A further step is to look for compatibilities in the two approaches. Since balanced growth is consistent with sectors growing at different rates, provided supply and demand are in balance, the distinctive feature of the alternative strategies must be the imbalance between supply and demand. Unbalanced growth would concentrate resources in a few selected areas, creating shortages elsewhere. But this is quite consistent with the 'big push' version of the balanced growth doctrine provided the scale of investment is sufficient to overcome indivisibilities and complementarities. If unbalanced growth is defined not so much in terms of shortages as in terms of concentration on certain activities, according to comparative advantage or the existence of increasing returns, balanced and unbalanced growth can be complementary strategies. There is no reason why development strategy should not draw on the strong points of both doctrines so that an optimum strategy of development combines some elements of balance as well as imbalance. The gain of real resources from concentration and specialisation must be weighed against the potential disadvantages, and perhaps a saving of resources through maintaining balance between sectors. Historically, growth has been unbalanced, and this is implicit in classical trade theory, with balance being restored through imports. By and large, the present developing countries are following the same route and pursuing a combination of strategies. Resources tend to be concentrated in a limited number of sectors, but within these sectors the investment programme attempts to maintain vertical balance. Concentration of effort is feasible in an open economy with the capacity to buy imports, and at the same time investment is on a large enough scale for complementary activities to be established recognising interdependencies in production and consumption.

It is the association of balanced growth with planning which has tended to polarise opinion on the two strategies; but unbalanced growth does not preclude planning. With a mixed strategy of concentration on particular sectors but balance within them, a decision has first to be made on which sectors to concentrate and then resources allocated accordingly.

If unbalanced growth precludes planning – indeed, if that is its appeal – the issue is largely one of the distribution of the gains from development. With balanced growth there is the opportunity to distribute the benefits of development more evenly throughout society, to remedy inequality, to control inflation and to avoid the unemployment of resources. With unplanned unbalanced growth there is no guarantee against unemployment, inflation and an unequal income distribution. Left to itself, unbalanced growth is essentially a doctrine of *laissez-faire*, with no safeguards against the socially divisive repercussions of change. At the purely economic level the two doctrines can be complementary rather than alternative strategies. But if unbalanced growth excludes planning and the co-ordination of decision-making, the implications of the two strategies may be very different.

■ Investment Criteria

Traditional micro theory teaches that under perfect competition resources will be optimally allocated when each factor of production is employed up to the point where its marginal product is equal to its price, and that society's output (welfare) will be maximised when the marginal products of factors are equated in all their uses. This is the so-called 'marginal rule' for resource allocation, and implies 'efficiency' in the sense that a society's total output of goods and services could not be increased by any redistribution of resources between activities because each factor of production is equally productive in existing activities. In static analysis, therefore, 'efficiency' in resource allocation implies maximising the national product, and this is achieved when the marginal products of factors are equated in their different uses.

If the application of the marginal rule leads to an efficient allocation of resources, what is the allocation 'problem' in developing countries? Why seek for other criteria to decide on the allocation of resources? One good reason is that the assumptions of traditional micro theory accord neither with the realities nor with the aspirations of developing countries. Two major drawbacks of the application of the marginal rule may be cited. One is that the marginal rule is a static criterion, and as we have said before it is by no means certain that the aim of developing countries is, or ought to be, the maximisation of the *present* level of output, consumption or welfare. Second, traditional static theory ignores a host of factors which may have a bearing on the *social* optimum allocation of resources. In countries characterised by fundamental structural disequilibria and extreme imperfections in the market, it cannot be assumed that the market prices of goods and factors of production reflect the social costs and benefits of production. The application of the marginal rule will only lead to a *socially* optimal allocation of resources in the absence of divergences between market prices and social costs and benefits, or if market prices are corrected to reflect social values.

Several factors may lead to divergences between market prices and the social valuation of goods and factors of production. If external economies and increasing returns are attached to some projects, their social value will exceed their private value, and the application of the marginal rule must make allowances for this if output is to be maximised from a given endowment of factors. Second, if perfect competition does not prevail in the product market, product prices will not reflect society's valuation of those products, and market prices must somehow be adjusted to achieve a social optimum. Similarly, if perfect competition does not prevail in the factor market, the price of factors will not reflect their opportunity cost to society so that employing factors up to the point where their marginal product equals their price will not produce a social optimum. Idle resources, such as labour, may be overvalued, and scarce resources, such as capital and foreign exchange, may be undervalued, and market prices must therefore be corrected to reflect the value of these resources to society. Third, static analysis ignores the future structure of product and factor prices arising from the choice of projects in the present. An optimum resource allocation in the present may not produce an optimal allocation of resources in the future. The only way of coping with this difficulty is through what is called the programming approach to resource allocation, by which the repercussions of one activity on others is explicitly considered and which makes due allowance for time. Last, the application of the marginal rule can only lead to optimal resource allocation on the assumption that the income distribution is 'optimal', and remains unaffected by whatever programme is decided on. If a new pattern of resource allocation alters the income distribution, output may be maximised but welfare diminished because of 'undesirable' changes in the distribution of income gains. To say anything concrete on this score requires an explicit statement of societal objectives if interpersonal comparisons of utility are to be avoided. Presumably there might be a fair degree of consensus that an income distribution which leaves half the population unemployed and starving is 'inferior' to one that does not. Only the conditions for Pareto optimality would deny it![1]

For all the above reasons, there has been a prolonged debate in recent years over the most appropriate criterion for resource allocation in the light of the development obstacles of developing countries and their aspirations. The different criteria that have been suggested reflect, by and large, differences of opinion as to what developing countries ought to attempt to maximise, the broad choice being between present and future levels of output and consumption. Most of the criteria discussed by early writers in this field refer to the allocation of capital, reflecting the view of domestic capital as the primary scarce resource. Increasingly, however, attention has been paid to the effects of resource allocation decisions on the balance-of-payments in recognition of foreign exchange as an equally scarce resource. We shall consider chronologically some of the more important ideas and criteria that have been put forward, before devoting a separate chapter to social cost-benefit analysis which has come to dominate the literature. Before we start, it should be stressed again that the investment criteria to be discussed refer to the *pattern* of investment, i.e. to what projects to choose, not to the choice of technology. This is not to say that the choice of projects may not have implications for the choice of techniques, but conceptually the two choices must not be confused.

Early Discussion of Project Choice

The Minimum Capital–Output Ratio Criterion

With the long tradition, from Adam Smith on, of emphasising capital's strategic role in the growth process, it is not surprising that early formulations of investment criteria concentrated on the need to minimise the use of capital per unit of output: hence the so-called **minimum capital–output ratio criterion** (or 'highest rate of turnover criterion', as it is sometimes called (see Kahn (1951)). Under this criterion the object of the allocation exercise is to minimise $I/\Delta O$ and maximise $\Delta O/I$, where $I/\Delta O$ is the incremental capital–output ratio and $\Delta O/I$ is the productivity of capital. Appealing as this criterion may seem, its use is open to a number of objections and suffers from all the deficiencies of static criteria just discussed. Apart from the very real difficulty of measuring the capital–output ratio, the criterion ignores the important factor of time. The capital–output ratio is measured by the amount of investment divided by the flow of output from that investment over an accounting period, normally one year. Since the lives of projects differ, however, it is quite possible for a project with a high capital–output ratio to produce a total output over its lifetime far greater than the same amount of investment in a project with a lower capital–output ratio but with a shorter life. It may be possible to overcome this weakness of the capital–output ratio criterion by choosing the project with the lowest ratio of capital to lifetime output, but care must be taken in doing this because the present (discounted) value of future output is a function of the time pattern of that output. The power of discounting increases the further one goes into the future so that even if a twenty-year project yields a higher total output than a ten-year project, if most of the output gain of the twenty-year project accrues at the end of the life of the project, the present value of the total output of the twenty-year project may be worth less than the present value of the lower total output of the project with the shorter life. But even if project lives were, or were assumed to be, roughly equal, differences in the annual capital–output ratio may still not provide a rational basis for policy action. Some projects may have a higher productivity of capital than others (and a lower capital–output ratio) owing to the greater efficiency of co-operating factors, but there may be no guarantee that these co-operating factors will be in elastic supply in the future. Thus projects with the lowest capital–output ratios in the present may turn out to have much higher capital–output ratios in the future owing to rigidities in the supply of other factors required to work with capital. Similarly, if technology is changing very rapidly, projects with the lowest capital–output ratios in the short run may not have the lowest capital–output ratios in the long run. Where capital is indivisible, the use of this criterion may also imply capital-intensive technology which means that scarce capital may have to be concentrated on a narrow range of activities, conflicting with the desire for balance in the economy and the diversification of exports. Capital-intensive technology may also produce undesirable economic and social repercussions by creating more urban and rural unemployment. There was no explicit discussion either of how the flow of output should be measured, whether at market prices or at prices adjusted to measure the social valuation of goods and factors of production. The concern with measuring costs and benefits from society's point of view led to use of the concept of *social marginal product*, with ΔO measured as the change in value-added to society.

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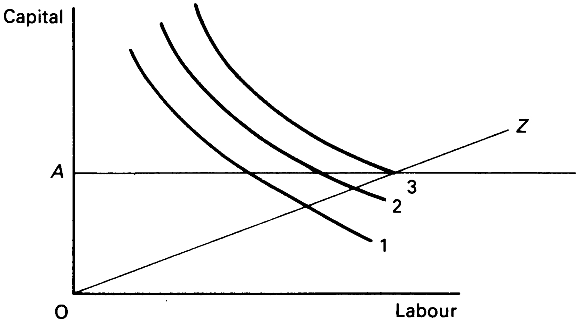
[1] A situation is said to be Pareto optimal only if a change which benefits some doesn't harm others.

☐ *The Social Marginal Product Criterion*

The social marginal product criterion for resource allocation would only give the same result as the minimum capital–output ratio criterion on the assumptions of no divergence between the market and social prices of goods and that the social cost of labour is zero. To see this, consider **Figure 7.2**, where the production functions, 1, 2, 3, represent successively higher levels of 'social output' that can be produced with different combinations of labour and capital. To minimise the capital–output ratio requires the maximisation of the output–capital ratio. With a fixed amount of capital, *OA*, the output–capital ratio is maximised when society is on its highest isoquant. Higher levels of output can be reached until the marginal product of labour is zero; that is, until the slope of the production function (or isoquant) is horizontal. When the marginal product of labour is zero, the social (or opportunity) cost of labour is zero.

Figure 7.2



Thus when labour has a zero opportunity cost, social marginal product would be maximised and the capital–output ratio minimised. *OZ* gives the optimum capital–labour ratio.

But all this is very static. There is no attention paid to the consequences for saving, investment, growth and hence the future level of consumption from the choice of projects in the present. Societies with an eye to the future, it was argued, ought to adopt a more dynamic investment criterion for project choice. Galenson and Leibenstein (1955) argued in this way in a classic article in 1955. In a sense they go to the other extreme, arguing that developing countries ought to strive for growth and the maximisation of future welfare, and allocate resources accordingly. Within a growth framework, the maximand becomes the accumulation of capital over time and the Galenson–Leibenstein criterion for resource allocation is the maximisation of what they call the 'marginal *per capita* reinvestment quotient'.

☐ *The Marginal* Per Capita *Reinvestment Quotient Criterion*

The basis of the Galenson–Leibenstein argument is that resources ought to be allocated to maximise '*per capita* output, or average income, either over time, or at some time in the future'. This requires maximising the investible surplus in the present to provide each additional unit of labour with as much capital as possible, since capital per head is the major determinant of output per head. If all projects have the same production functions, this would imply the allocation of capital to projects with a much higher capital intensity than if the objective was to maximise total consumption output in the present. If the objective of development is to maximise total output *per capita* at some future point in time, therefore, investment resources should be allocated to give each worker in the future as much additional capital as possible. Galenson and Leibenstein call this allocation rule the **marginal per capita reinvestment quotient (MPCRQ) criterion**, and the objective becomes to allocate investment resources such that the MPCRQ is equalised in all uses. Seven basic factors will determine the size of the marginal *per capita* reinvestment quotient: (1) the gross productivity per worker; (2) the amount of wage goods consumed per worker; (3) the replacement and repair of capital; (4) improvements in the skills and efficiency of workers which are unrelated to capital accumulation; (5) decline in mortality rates; (6) decline in fertility rates; and (7) the direction of reinvestment.

The Galenson–Leibenstein approach is designed to take account of the influence of projects on the rate of capital accumulation, or, to put it another way, to take account of the choice of projects on the distribution of income between savers and spenders. The economic basis of the approach is the belief that the level of *per capita* output is largely determined by the capital–labour ratio, and the amount of capital per worker must largely depend on the level of profits (the surplus over wages) stemming from the original investment.

This view is very much in line with Lewis's argument that the saving and investment ratio in developing countries is dependent on the size of the capitalist surplus. Without question, the implication of the application of the MPCRQ criterion would be relatively capital-intensive projects which minimise the use of labour and the payment of wages, leaving the maximum possible surplus for future reinvestment. The present level of employment and output would be sacrificed for the sake of more investment to raise the level of output per head in the future.

The marginal *per capita*[1] reinvestment quotient is defined as:

$$r = \frac{p - ew}{k} \qquad (7.1)$$

where p is the (net) output (value-added) from the investment, e is the number of workers attached to the investment, w is the real wage, and k is the cost of the investment. r is also the growth rate because on the assumption that all wages are consumed, and in addition that all profits are reinvested, the reinvestment formula is equal to the Harrod growth formula s/c, where s is the savings ratio and c is the incremental capital–output ratio. That is:

$$r = \frac{p - ew}{k} = \left(\frac{p}{k}\right)\left(1 - \frac{ew}{p}\right) = s/c \qquad (7.2)$$

where $s = (p - ew)/p$ and $c = k/p$.

The growth rate is maximised but at the expense of the present level of consumption and employment. Hence the MPCRQ criterion would appear to go to the other extreme from the static marginal criterion by neglecting present consumption and welfare, concentrating instead on building up the means of production for a greater volume of output and consumption in the future. The criterion suggested by Galenson and Leibenstein has been criticised on the grounds that its use would lead to excessively capital-intensive projects and the sacrifice of present employment. It is true that the adoption of the criterion *may* lead to more capital-intensive projects and less employment than if the objective function was to maximise the level of present consumption. Having conceded this, however, a number of considerations need to be borne in mind. First, it should be noted that the point of maximum surplus using the Galenson–Leibenstein criterion is the point where the marginal product of labour is equal to the wage. In this sense, the criterion is no different from the static neoclassical optimising criterion of the private firm. The fact that the Galenson–Leibenstein criterion apparently leads to a greater capital intensity than the earlier investment criteria is because the Galenson–Leibenstein criterion takes the market wage as the cost of labour, whereas the other criteria implicitly assume a shadow wage of zero. If the market wage is low, however, pursuing the Galenson–Leibenstein criterion will still lead to relatively labour-intensive projects in the industries in which the developing countries choose to specialise. It is not correct to interpret the Galenson–Leibenstein criterion, as some writers have done, as aiming to maximise the capital–labour ratio, though Galenson and Leibenstein lay themselves open to this interpretation by talking of maximising 'the amount of capital per worker'. What they mean is maximising the surplus per *future* worker. Second, it is worth pointing out that the criterion is not so extreme as other plausible investment criteria that might be applied, such as the allocation of investment resources to maximise output and savings per head of the population so as to maximise society's savings ratio. Third, it can be shown that the clash between employment and saving may disappear entirely if the wage rate and the capital intensity of production are positively related. Fourth, the conflict is minimised the smaller the difference between the propensity to save of workers and capitalists. The conflict may also be minimised by appropriate tax and subsidy policies. These last three points and others are considered in more detail in Chapter 10 on the choice of techniques.

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[1] Note: *per capita* does not refer to reinvestment per unit of the *existing* labour-force but of the future labour-force.

Galenson and Leibenstein's analysis is useful in stressing the relationship between the choice of projects, the distribution of income and the rate of saving, but their precise conclusions rest on the assumption that saving and investment are solely functions of the distribution of income, and nothing else. But suppose that saving depends on the total level of income as well (which will not be maximised if labour as the abundant factor is not employed up to the point where its marginal product is equal to its opportunity cost). If so, it may not be wise simply to aim at maximising the total surplus. The level of output must also be considered. There are a number of reasons why total output may be important, not the least of which is that the less the amount of employment offered, the greater the level of unemployment and the greater the probability of consumption in excess of production, and therefore dissaving. If total saving is a function of total income, as well as its distribution, a compromise must be reached between maximising the surplus choosing capital-intensive projects, and maximising total output choosing less capital-intensive projects.

Moreover, should not some allowance be made for the fact that society is bound to value present consumption more than future consumption by some margin, however small, if only because if present consumption is less than future consumption its marginal utility is higher? If so, an investment criterion is required which reflects both the immediate contribution of projects to consumer welfare and the future welfare made possible by additions to the capital stock from saving generated by the current investment. A partial solution to the problem of the relative valuation of present and future consumption, and hence the choice of projects, is to fix a time horizon, acceptable to society, within which future welfare gains must offset welfare losses in the present.[1] If this time horizon exceeds the actual length of time it takes for welfare gains to match welfare losses, relatively capital-intensive projects may be favoured with some sacrifice of present consumption. If, however, the period over which future welfare gains just compensate for welfare losses in the present exceeds the acceptable time horizon, relatively labour-intensive projects should be favoured. Needless to say, this approach is very arbitrary depending on the time horizon chosen. If, however, some democratic consensus can be reached, this would appear to be a better solution to the inevitable clash between present and future consumption than a straight choice between one or other of the investment criteria discussed above which in their basic form ignore the trade-off between present and future welfare.

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[1] This is suggested by Professor A. K. Sen in *Choice of Techniques (1968).*

The Marginal Growth Contribution Criterion

An early attempt to reconcile the traditional static social marginal product criterion with the 'dynamic' Galenson–Leibenstein criterion was made by Eckstein (1957). Eckstein developed what he called the **marginal growth contribution criterion** which reflects both a project's direct contribution to consumers' welfare and its indirect contribution made possible by additions to the capital stock resulting from reinvestment of the savings generated by the project. The criterion is derived by maximising the present value of the future consumption steam:

$$B^{**} = \sum_{t=0}^{T} \frac{(1-\alpha)}{(1+r)^t} B_t + \sum_{t=0}^{\infty} \frac{(1-\alpha_r) B_{rt}}{(1+r)^t} \qquad (7.3)$$

where α is the share of the projects's net benefits that goes into saving for future reinvestment, B_r is the net benefit made possible by the reinvested saving (in order to know this we would have to know the marginal product of capital), α_r is the share of the output of projects financed out of *reinvested* savings which will become available for further reinvestment (and so on, *ad infinitum* – hence $\sum_{t=0}^{\infty}$), and T is the life of the project.

The first part of the expression in equation (7.3) measures the direct contribution of the project to consumption. The second part takes account of the cumulative future benefit made possible by the increased rate of capital accumulation from the project's reinvested savings. Expressing equation (7.3) as a proportion of the capital invested would give a calculation of the social marginal product which incorporates Galenson and Leibenstein's fundamental point that project selection ought not to be considered independently of the effect of a project on the level of saving and future output. Now a project which looks 'efficient' on the ordinary SMP criterion may look inferior to another if its reinvestment ratio is low because it is making no contribution to raising the level of future output.

The Social Welfare Function

We end this chapter by briefly considering how the multiplicity of benefits from a project may be evaluated when the benefits are measured in different units. If developing countries are interested in choosing projects which provide as much employment as possible, and which improve the distribution of income, as well as adding to consumption now or in the future, how are these benefits to be added together and how are different projects to be compared which yield different combinations of such benefits? One approach to the solution of this difficulty is to construct what is called a **social welfare function** in which all objectives are first weighted and then translated into a common unit of account. Suppose B_1, B_2 and B_3 represent the levels of benefits from different objectives, but are measured in different units, and suppose that a planner considers that w_1 units of B_1 is equivalent to w_2 units of B_2 and also to w_3 units of B_3. Total benefit is then:

$$B = w_1B_1 + w_2B_2 + w_3B_3 \qquad (7.4)$$

One of these benefits can then be chosen as the common unit of account (or *numéraire*), and total benefit can be expressed in these units. For example, suppose it is decided to express total benefits in units of B_1. We can then divide everything by w_1 so that the new weights attached to B_2 and B_3 represent the amounts of B_2 and B_3 that are equivalent to one unit of B_1. Equation (7.4) becomes:

$$B = B_1 + \frac{w_2B_2}{w_1} + \frac{w_3B_3}{w_1} \qquad (7.5)$$

For n different benefits:

$$B = \sum_{i=0}^{n} k_iB_i$$

where k_i are the weights representing the rates at which society is willing to substitute one benefit for another ($k_1 = 1$; $k_2 = w_2/w_1$; etc). The weights attached to different benefits may of course change through time, depending on how the objectives of the development policy change with time.

Let us illustrate with a simple numerical example. Suppose that an extra unit of consumption (B_1) is worth 10 times an extra unit of employment (B_2) and 5 times a 1 per cent reduction in the Gini ratio measuring the degree of income inequality (B_3). If we take consumption as *numéraire*, equation (7.5) becomes:

$$B = B_1 + \frac{1}{10} B_2 + \frac{1}{5} B_3 \qquad (7.6)$$

Thus, a project yielding 100 units of consumption, 20 extra jobs, and a reduction in the Gini ratio of 1 per cent would yield a benefit of

$$B = 100 + \frac{20}{10} + \frac{1}{5} = 102.2$$

Provided the weights attached to different benefits are specified, projects yielding different combinations of benefits measured in different units can be compared.

To use the social welfare function for project appraisal, the sum of benefits measured in a common unit of account, and properly discounted, must then be expressed as a ratio of some scarce factor that goes into the project, e.g. capital or foreign exchange, if the scarce factor is to be allocated to maximise social benefit.

In conception the social welfare function is very similar to the notion of social product. Its appeal is that every goal and aspiration can be included in it, and diverse benefits measured, provided the relative worth of one objective, or benefit, relative to another is specified.

Questions for Discussion and Review

1. In what ways may the market mechanism fail to provide a socially desirable allocation of resources in developing countries?
2. What are the major causes of divergences between the market price of goods and their social valuation?
3. What are the major causes of divergences between the market price of factors of production and their cost to society?
4. Does the replacement of the market mechanism by planning necessarily imply abandonment of the price system?
5. Why do developing countries construct development plans?
6. What do you understand by the concept of 'balanced growth'?
7. What is Hirschman's major criticism of the doctrine of balanced growth?
8. What major factor distinguishes static from dynamic investment criteria for the allocation of resources?
9. What is the purpose of constructing a social welfare function?
10. Should countries be guided by the law of comparative advantage in the allocation of investment resources?

■ Chapter 8 ■

Project Appraisal, Social Cost–Benefit Analysis and Shadow Wages

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The literature and discussion about project choice and the allocation of resources has been dominated in recent years (since 1970) by **social cost–benefit analysis.** Social cost–benefit analysis is really the public analogue or equivalent of the **present value method** of private investment appraisal, but it has to take many things into account which adds to its complexity. The technique is recommended for the appraisal of publicly financed investment projects in order to allocate resources in a way most profitable to society, recognising that the market prices of goods and factors of production do not necessarily reflect their social value and costs, respectively, and, given that society is concerned with the *future* level of consumption as well as the present, the level of current saving may be sub-optimal. In a sense, social cost–benefit analysis tries to incorporate all the considerations that previous criteria have stressed as important to consider, and thus may be said to have superseded them.

■ Project Appraisal

When we are talking about public investment we are talking mainly about public infrastructure projects (such as roads and water supplies) and public enterprise projects (such as steel mills, power plants etc.). In addition, there are other categories of state-supported investment where social cost–benefit analysis may be applied such as private sector projects financed by public credit (e.g. small-scale industries financed through State Development Banks) and private sector projects subject to public control (e.g. transport and mining ventures).

In discussing project appraisal, there is a distinction to be made between financial, economic and social appraisal.

Financial Appraisal has to do with the financial flows generated by the project *itself* and the direct costs of the project measured at market prices.

Economic Appraisal has to do with adjusting costs and benefits to take account of costs and benefits to the economy at large, including the indirect effects of projects which are not captured by the price mechanism.

Social Appraisal has to do with the distributional consequences of project choices, both intertemporal (i.e. over time) and intra-temporal (i.e. between groups in society at a point in time).

A typical **Project Appraisal Report** would consist of the following:

1 the terms of reference;
2 an engineering study to see whether the project is technically feasible;
3 a financial study to ascertain how much the project will cost in budgetary terms, at market prices;
4 an appraisal of the **economic** costs and benefits, valuing outputs and inputs at social prices and including secondary impacts on the economy and the effect on the distribution of income;
5 details of the administrative requirements of the project;
6 conclusions and recommendations.

Project appraisal or project planning must be thought of as a process of decision-making over time, starting with the **identification** of projects (in relation to the planning process which may have set a target growth rate), and going through **stages** of various **feasibility** studies e.g. engineering, financial etc., then the **investment** phase, and finally **evaluation**. This is the notion of the **project cycle.**

Financial Appraisal

We first turn to financial appraisal and consider how to calculate the **Net Present Value** of an investment. The first step in project (investment) appraisal is always the identification of the flows involved. First there is the investment cost in the initial period. Second, there are the operating costs, e.g. labour and raw materials. Third, there is the value of the output (sales multiplied by price). Fourth, there is the question of the life of the project. The value of the flows must then be **discounted** to obtain their **present value** because everything has an opportunity cost. To have £100 next year is not the same as having £100 in the present, because £100 now could be invested at a rate of interest, say 10 per cent, to give £110 next year. The future and the present are made equivalent by discounting future sums by the rate of interest. The present value (PV) of any future value (FV) in period t is $FV_t/(1 + r)^t$, where r is the rate of interest (or discount rate). We can show this with a simple algebraic example: The value of a present sum after one year invested at rate, r, is $FV_1 = PV(1 + r)$. After two years the sum is worth $FV_2 = [PV(1 + r)](1 + r) = PV(1 + r)^2$ and so on. Therefore $FV_t = PV\ (1 + r)^t$, and hence $PV = FV_t/(1 + r)^t$.

The net present value (NPV) formula is then:

$$\text{NPV} = \sum_{t=0}^{T} \left(\frac{V_t - C_t}{(1 + r)^t} \right) - K_o \qquad (8.1)$$

where K_o is the fixed cost of the project in the base period
V_t is the value of output at time t
C_t are the operating costs at time t
r is the rate of discount
and T is the life of the project

If NPV > 0, the project yields a positive return.

Let us give a numerical example of a small shoe factory, the initial cost of which is £5 million and which yields a net cash flow over 5 years of £2 million per annum, with a rate of interest of 8 per cent. **Table 8.1** gives the calculation of net

Table 8.1 ***Numerical Example of the Calculation of Net Present Value***

Year (t)	*Net cash flow* ($V_t - C_t$)		*Discount factor* $1/(1 + 0.08)^t$	*Discounted cash flow*
0	–5		–	– 5.00
1	2	x	0.926	+ 1.85
2	2	x	0.857	+ 1.71
3	2	x	0.794	+ 1.59
4	2	x	0.735	+ 1.47
5	2	x	0.681	+ 1.36
			Net present value =	+ 2.98

present value. The project yields a net present value of £2.98 million.

■ Economic Appraisal

First of all, let us consider the secondary (or indirect) costs and benefits that may arise from public projects, and then consider how to adjust the market prices of goods and services and factors of production in order to take account of their **economic** value to society at large. There are three major indirect effects to consider:

1. First there is the economic impact of the project on the immediate vicinity of the project. Some projects, of course, such as an irrigation scheme, are designed to have an impact on the immediate vicinity, and their benefits would be counted as direct benefits, but other projects will have incidental indirect effects, both positive and negative. A new road, for example, which is designed to cut travel time may raise output in the immediate vicinity. This is a positive benefit. On the other hand, a new dam to generate electricity may flood arable land and reduce agricultural production. This is a negative indirect effect.
2. Second, there are the price effects upon local markets. If, for example, prices fall as a result of a project, this represents a gain in consumer surplus, and this needs to be added to the value of the project. A new road which reduces supply costs will reduce the price of local supplies and will represent an indirect benefit of the road.
3. Third, there are the consequences of a project for other sectors that supply inputs to the project. If a project demands more inputs, this is income to the supplier. For example, a new dam will require local materials; a new factory will demand steel and so on. These repercussions need taking account of.

Beyond the secondary (or indirect) effects of projects, the market prices of goods produced, and the factors of production used, may not reflect their value to the economy as a whole. The prices need adjusting to reflect their true economic value to society.

In economic appraisal (as opposed to financial appraisal), we now have to redefine the variables in the net present value formula in equation (8.1) to ascertain whether a project is profitable to society at large.

V_t is the flow of social benefit **measured at economic (or efficiency) prices**
C_t is the **social** cost of inputs (measured by opportunity cost)
r is the **social** rate of discount
K_o is the **social** cost of the investment

A project will be profitable to society if the **social** benefits of the project exceed the **social** costs, or, to put it another way, if the net present value of the project to society is greater than zero.

The question is: how should a project's social benefits and costs be measured, and what common unit of account (or *numéraire*) should the benefits and costs be expressed in, given a society's objectives and the fact that it has trading opportunities with the rest of the world so that it can sell and buy outputs and inputs abroad (so that domestic and foreign goods need to be made comparable)? There are two broad approaches to this question.

First, benefits and costs may be measured at domestic market prices using consumption as *numéraire*, with adjustments made for divergences between market prices and social values, and making domestic and foreign resources comparable using a shadow price of foreign exchange. This is sometimes referred to as the **UNIDO approach** (see Dasgupta, Marglin and Sen (1972)).

Second, benefits and costs may be measured at **world prices** to reflect the true opportunity cost of outputs and inputs (obviating also the need to use a shadow foreign exchange rate), using public saving measured in foreign exchange as *numéraire* (i.e. converting everything into its foreign exchange equivalent). This is referred to as the **Little–Mirrlees approach** (see Little and Mirrlees (1969) and (1974)). The fact that foreign exchange is taken as *numéraire* does not mean that project accounts are expressed in foreign currency. The unit of account remains the domestic currency, but the values recorded are the foreign exchange equivalent, i.e. how much net foreign exchange is earned.

Before proceeding to contrast the approaches, and to look at the problems of measurement, let us consider the important divergences which require correction between the market prices of goods and factors of production and their value to society.

Divergences Between Market Prices and Social Values

The market prices of goods may not reflect their social value for a number of reasons:

1. First, the government imposition of taxes, subsidies, tariffs and controls of various kinds distort free market prices. Opportunity cost must be measured *net* of taxes and subsidies.
2. Secondly, imperfections in the market will raise prices above the marginal cost of production. Prices set by private monopolists and public utilities may be particularly distorted.
3. Thirdly, the existence of externalities, both positive and negative, will mean that the prices of goods do not reflect their true value to society.

The market prices of factors of production may not reflect their true cost to society – that is, the opportunity cost of using them measured by their marginal product in alternative uses. Labour's market price in the industrial sector (i.e. the industrial wage) is likely to exceed the cost to society of using labour if there is disguised unemployment on the land or in the petty service sector. Capital's market price will be below its social cost if it is subsidised. Foreign exchange may also be too cheap from a social point of view if the exchange rate (measured as the domestic price of foreign currency) is kept artificially low by exchange controls of one form or another.

The existence of external economies and diseconomies may also cause divergences between the market price of inputs and their social cost. If, for example, a project purchases inputs from decreasing cost industries, the social cost is not equal to the price based on average cost but to the lesser figure of marginal cost.

It is also possible that aggregate saving and investment in an economy is less than socially desirable, but the market does not allow individuals to express a preference for a higher rate of investment and capital accumulation for growth and future welfare. This is another example of the isolation paradox – one solution to which is for planners to use a social discount rate lower than the market rate of interest to encourage more investment than if the market rate of interest was used for calculating net present value.

Market prices adjusted for these various divergences and distortions are called **shadow, social** or

accounting prices. Adjusted market prices for goods we shall call social prices, and adjusted market prices for factors of production (including foreign exchange) we shall call shadow prices.

■ Social Prices for Goods

The first divergence mentioned above requires finding social prices for goods. As already stated, either domestic market prices may be corrected for the various distortions and imperfections, with domestic and foreign goods made comparable using a shadow price of foreign exchange (the UNIDO approach), or goods may be valued at world prices, as recommended by Little and Mirrlees. Doing the latter, it is argued, will give a truer measure of the social valuation of goods than the first alternative of measuring some goods at domestic prices (with adjustments), traded goods at their international price, and then making domestic and foreign goods comparable using a shadow foreign exchange rate which may itself be subject to distortions. To give a simple example of the point being made: the effect of a project to produce more wheat is to save wheat imports. The true economic value of wheat output is its import price (including cost, insurance and freight – c.i.f.) *whatever the domestic price is*. The same argument applies if the wheat is exported; its true economic value is its border price (free on board – f.o.b.), i.e. what the foreign exchange will buy in world markets.

The Little–Mirrlees approach of using world prices for measurement presents no major problems when goods are tradeable. The problem comes with **non-traded goods** which by definition do not have world prices. Some method has to be found of converting non-traded goods prices into their foreign exchange equivalent.

■ Non-Traded Goods and Conversion Factors

If we compare and contrast the two approaches for valuing goods (i.e. the UNIDO versus the Little–Mirrlees approaches) what we find is that the two approaches amount to the same thing if the **conversion factor** used to convert the value of non-traded goods into their foreign exchange equivalent is the reciprocal of the **shadow price of foreign exchange**, i.e. the reciprocal of the ratio of the shadow exchange rate to the official exchange rate. Let us give a simple illustration. Suppose we have a project producing exports, which uses both foreign and domestic inputs. Using the UNIDO methodology, the net benefit would be estimated as:

$$\text{Net Benefit} = (SER)(X - M) - D, \qquad (8.2)$$

where X is the border price of exports, M is the border price of imported inputs, D is domestic inputs, and SER is the shadow exchange rate (assuming the official exchange rate does not accurately reflect the true value of foreign exchange to the economy). Goods are all valued at domestic prices but revalued by the shadow exchange rate.

If net benefit was greater than zero at the appropriate discount rate, the project would be acceptable.

By contrast, Little and Mirrlees take foreign exchange as *numéraire* (because extra foreign exchange in government hands is an addition to saving and investment) so that:

$$\text{Net Benefit} = (OER)(X - M) - \alpha D \qquad (8.3)$$

where OER is the official exchange rate and α is the conversion factor which converts the value of domestic inputs into its foreign exchange equivalent, and is defined as the ratio of OER/SER.

It is clear that the two approaches are equivalent since multiplying equation (8.2) by $OER/$ SER yields equation (8.3). The reciprocal of this ratio, i.e. SER/OER, is the shadow price of foreign exchange – say, P_F. Therefore $\alpha = 1/P_F$.

How do we derive the conversion factor (α)?

The true economic cost of any good is, in theory, its marginal social cost. In principle, to find the world price of non-traded goods (such as transport facilities; electricity supply, haircuts, etc.) each non-traded good could be decomposed into its traded and non-traded components in successive rounds – backwards, through the chain of production. A detailed input–output table would be required for the job to be done properly. If it could be done, this would give a different social price for each non-traded good.

In practice, only special inputs are treated in this way. For practical reasons, approximations have to be made for the valuation of most non-traded goods at world prices, and for this purpose it is convenient to have a **standard conversion factor** (SCF). The SCF translates domestic prices into border prices (measured at the official exchange rate) i.e.

$$(SCF)P_d = P_w(OER) \tag{8.4}$$

where P_d is domestic prices; P_w is world prices, and OER is the official exchange rate measured as the domestic price of foreign currency. In this sense, the standard conversion factor (SCF) is the reciprocal of the shadow price of foreign exchange (P_F). To show this, from (8.4) we have:

$$SCF = \frac{P_w}{P_d}(OER) \tag{8.5}$$

or

$$SCF = \frac{1}{\dfrac{P_d}{P_w(OER)}} \tag{8.6}$$

where P_d/P_w is the shadow exchange rate (SER) i.e. the price of goods in domestic currency relative to their world prices, i.e.

$$\text{SCF} = \frac{1}{\dfrac{SER}{OER}} = \frac{1}{P_F} \tag{8.7}$$

Let us give a numerical example. Suppose that in India the official foreign exchange price of a bicycle costing \$100 is 200 rupees (assuming, therefore, an official exchange rate (OER) of 2 rupees per dollar), but that the \$100 bicycle can be sold in India for 250 rupees. This means, in effect, that the domestic price of foreign exchange is too low and should be raised (i.e. the currency should be devalued) to reflect its opportunity cost. Dollars are scarcer than the actual exchange rate allows for. In this case, the rupee is overvalued by 25 per cent because each rupee's worth of foreign exchange provides goods worth 25 per cent more when measured at domestic market prices. The shadow exchange rate should be 2.5 rupees to the dollar. Extending this line of argument to many commodities, the shadow price of foreign exchange may be written as:

$$P_F = \sum_{i=1}^{n} f_i \left(\frac{P_{di}}{P_{wi}(OER)} \right) \tag{8.8}$$

where i is the ith import and f_i are the weights.

In the case of one commodity – bicycles:

$$P_F = \frac{250}{200} = 1.25$$

Therefore, the standard conversion factor (SCF) is:

$$SCF = \frac{1}{P_F} = \frac{1}{1.25} = 0.8 \tag{8.9}$$

This equals the official exchange rate (2 rupees to the \$) divided by the shadow exchange rate (2.5 rupees to the \$) i.e. $\alpha = \frac{\text{OER}}{\text{SER}} = \frac{2.0}{2.5} = 0.8$

■ Traded Goods

Traded goods also need valuing. Little and Mirrlees distinguish three categories of traded goods:

1 commodities that are being exported and imported with infinite elasticities of demand and supply, respectively;
2 commodities traded with less than infinitely elastic demand and supply;
3 commodities that are not currently traded but

which are potentially tradeable if the country adopted optimal trade policies.

For commodities in the first category, the valuation is in principle straightforward. Exports and imports should be valued at border prices, *net* of taxes, tariffs, transport and distribution costs etc. If import supply is infinite (the small country assumption), the foreign price of imports will not change as import demand rises. Likewise, if the demand for exports is infinite, export price will not be affected if more exports are supplied.

For commodities in the second category, the supply of imports can be assumed to be infinite, but the demand for exports may be less than infinite. In this case, the foreign exchange impact will be less than the border price times the quantity sold. In other words, marginal revenue is less than price. In this case, the social price of the good is the border price multiplied by $(1 - 1/\eta)$, where η is the price elasticity of demand. If $\eta = \infty$, the social price is the border price; if $\eta = 1$, the social price is zero, and if $\eta < 1$, the social price is negative.

For commodities in the third category which are potentially tradeable, these can be treated as traded goods for all practical purposes.

Shadow Prices for Factors of Production

The second divergence mentioned above between market prices and social values requires finding shadow prices for factors of production. We shall spend some time below considering the Little–Mirrlees derivation of the shadow price of labour which in many ways is the most important price to calculate. It is through the valuation of labour that projects using domestic inputs as opposed to foreign inputs are encouraged or discouraged. Moreover, as we shall see, the shadow price of labour can take into account *both* the opportunity cost of labour *and* the effect of new projects on saving, if saving is suboptimal. It can thus incorporate distributional considerations over time and between social groups. **In this way, the shadow price of labour bridges economic and social appraisal.** The output forgone from the employment of more labour on projects and the increased consumption (or lost saving) must, of course, be valued at world prices using Little–Mirrlees methodology. This requires estimation of consumption conversion factors.

We have already discussed estimation of the shadow exchange rate which will be redundant in the Little-Mirrlees methodology, but will be necessary using the UNIDO approach.

The Social Rate of Discount

The choice of discount rate depends on the *numéraire* taken. If consumption is taken as *numéraire*, the appropriate discount rate is the **consumption rate of interest** (CRI), measured as the rate at which the marginal utility of income declines which may be approximated by the market rate of interest.

If public saving (measured by foreign exchange) is taken as *numéraire*, the appropriate discount rate is the rate at which the marginal utility of public saving falls. This rate is termed the **accounting rate of interest** (**ARI**) which should equal the rate of return on public money. In practice, the ARI is determined by trial and error such that its value does not pass more projects as profitable than the investment budget allows. The alternative would be to take the marginal rate of return on private capital as a measure of opportunity cost, on the grounds that public investment ought to produce benefits at least equal to the rate of return forgone if the resources had been invested privately. This assumes, however, that public and private investment compete for funds.

For the UNIDO and Little–Mirrlees approaches to project appraisal to give the same result, clearly the CRI and the ARI must be equal, which will be the case if the relative valuation of saving compared with consumption stays unchanged. This can be shown as follows. Let U_I be the utility weight of public money (saving) and V_c be the utility weight of consumption. Thus, $S = U_I/V_c$ is the relative valuation of saving compared to consumption. It then follows that (taking small rates of change):

$$\frac{dS}{S} = \frac{dU_I}{U_I} - \frac{dV_c}{V_c} = ARI - CRI \qquad (8.10)$$

If S is constant (so that $dS/S = 0$), the accounting rate of interest will equal the consumption rate of interest. If S is falling through time, however, which seems likely as countries get richer, then $dS/S < 0$ and $ARI < CRI$.

■ The Social Cost of Investment

If investment is wholly at the expense of consumption, the social cost of the investment may be measured by the current sacrifice of consumption, if consumption is *numéraire*. If investment in one project is partly at the expense of other investment, a part of the costs of the sacrifice of consumption is deferred until the time the displaced investment would itself have yielded consumption.

If saving expressed in foreign exchange is taken as *numéraire*, the cost of the investment must be valued at world prices.

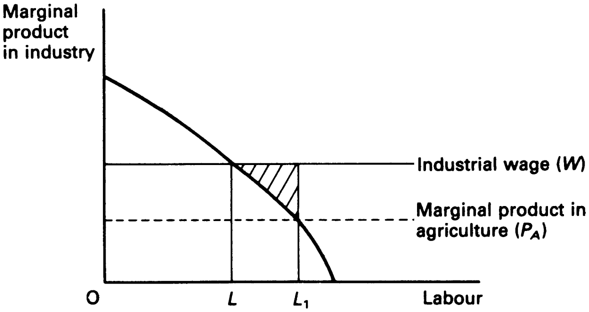
A numerical example comparing the Little–Mirrlees and UNIDO approaches, applying equation (8.1), will be given after we have considered the social cost of the variable inputs (C_t), the chief input being that of labour. We turn now, therefore, to the important topic of the valuation of labour and the determination of the shadow wage rate.

■ The Shadow Wage Rate[1]

In a dual economy, such as the typical developing country, where the marginal product of labour differs between sectors and in which saving is sub-optimal, there are two aspects to the measurement of the social cost of the use of more labour in projects:

1 The first is the opportunity cost of the labour in alternative uses, which could be the marginal product in agriculture, or perhaps the earnings to be had on the fringe of the industrial sector in the informal service sector (P_A).
2 The second is the present value of the sacrificed saving that results if an attempt is made to maximise present output by equating the marginal products in the different sectors.

Figure 8.1



Consider **Figure 8.1**, which depicts the industrial sector of the economy.

Total output in the economy will be maximised when labour is employed in industry up to the point where the marginal product in industry is equal to that in alternative uses (say, agriculture), i.e. up to L_1 in **Figure 8.1**. But note at this employment level, the industrial wage exceeds the marginal product of labour and if all wages are consumed there would be a loss of saving equal to the shaded area. If saving is sub-optimal, the optimal shadow wage cannot be the marginal product of labour in alternative uses. Savings would be maximised at employment level, L, where the marginal product of labour in industry is exactly equal to the industrial wage, but at the expense of employment and present consumption. No society places an infinite valuation on saving at the margin. Thus the optimal shadow wage cannot be the industrial wage. Clearly, the shadow wage is going to lie somewhere between the limits of the opportunity cost of labour on the one hand and the industrial wage on the other, depending on the relative valuation of saving and consumption. We may derive the optimal shadow wage by putting the costs of using an additional unit of labour equal to the benefits, and solving the equation. The social cost of the labour is:

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[1] The discussion here takes the approach of Little and Mirrlees, the origin of which can be found in Sen (1st edn, 1960) and Little (1961). To see the affinity of the approaches, see Thirlwall (1971), reprinted in Livingstone (1981). See later for the equivalence of the Little-Mirrlees and UNIDO approaches.

$$P_A + (C - m) \tag{8.11}$$

where P_A is the opportunity cost of labour and $(C - m)$ is the *total* net increase in consumption, (C is the increase in consumption in industry and $-m$ is the fall in consumption in agriculture as labour migrates).

The social benefit of the labour used on the project is its marginal product (P_I), plus that part of the increase in consumption that is valued which we may write as $(C - m)/S_o$, where S_o is the valuation of saving (or future consumption) relative to present consumption. The total social benefit is thus:

$$P_I + \frac{(C - m)}{S_o} \tag{8.12}$$

Labour should be employed up to the point where the social benefit is equal to the social cost, i.e. up to the point where:

$$P_I + \frac{(C - m)}{S_o} = P_A + (C - m) \tag{8.13}$$

or

$$P_I = P_A + (C - m)\left(1 - \frac{1}{S_o}\right) \tag{8.14}$$

This defines the optimum shadow wage rate (W^*). In words, the shadow wage is equal to the loss of agricultural output, plus the increase in consumption, less that part of the increase in consumption which is treated as a benefit.

Within this framework we can see the two bounds between which the shadow wage will lie. If societies are indifferent between the present and the future, the valuation coefficient of saving relative to consumption will equal unity ($S_o = 1$) and the shadow wage from equation (8.14) will be:

$$W^* = P_A \tag{8.15}$$

which is the opportunity cost of labour in alternative uses. This is the standard, static result. If the opportunity cost of labour is zero, the shadow wage would be zero. If it is positive, as in **Figure 8.1**, the shadow wage would give employment level, L_1.

At the other extreme, if societies place an infinite valuation on the future and none on the present then the valuation coefficient of saving relative to present consumption would be infinite ($S_o = \infty$), and the shadow wage from equation (8.14) will be:

$$W^* = P_A + (C - m) \tag{8.16}$$

If workers' consumption in agriculture (m) is equal to their marginal product (P_A), and the increased consumption in industry (C) represents increased workers' consumption out of the wage (W),[1] so that $C = W$, then the shadow wage is equal to the industrial wage:

$$W^* = W \tag{8.17}$$

In **Figure 8.1**, this would give employment level, L, where savings are maximised.

In practice, the shadow wage will lie somewhere between P_A and W, depending on the value of S_o. How do we measure the relative valuation of future versus present consumption? An approach originally suggested by Sen (1960), and embraced by Little and Mirrlees, is to take a time horizon acceptable to society and to calculate the present value of the future consumption gains arising from investment now, relative to the current consumption sacrifice. Thus:

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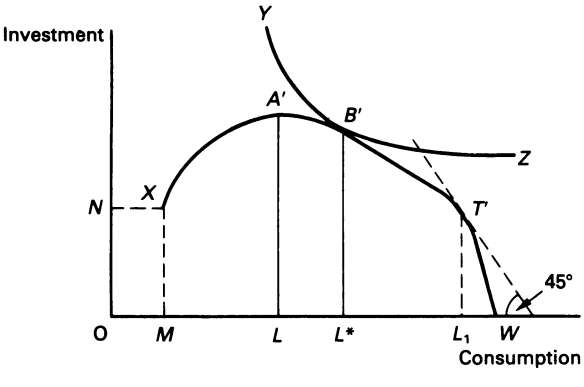
[1] Implicitly assuming for the time being that the propensity to consume of capitalists out of profits is zero and the propensity to consume of workers out of wages is unity. We relax this assumption later.

Figure 8.2



$$S_o = \frac{\dfrac{C_1}{(1+i)} + \dfrac{C_2}{(1+i)^2} + \ldots + \dfrac{C_t}{(1+i)^t}}{C_o} = \frac{\sum_{t=1}^{T} \dfrac{C_t}{(1+i)^t}}{C_o} \qquad (8.18)$$

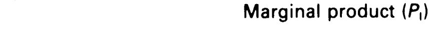
The value of S_o will depend on the marginal product of capital, the length of the time horizon (T) taken, and the discount rate (i) chosen. The longer the time horizon, and the lower the discount rate, the higher S_o and the higher the shadow wage rate. If $S_o = 3$, for example, then assuming P_A and m to be very small, the shadow wage would be approximately two-thirds of the industrial wage. In the Little–Mirrlees approach to project appraisal, the shadow wage is the principal means by which the scarcity of foreign exchange is allowed for. The lower the shadow wage, the greater the use of domestic resources.

We can illustrate how the trade-off between the present and the future affects the shadow wage and the level of employment with the aid of a simple diagram used by Joshi (**Figure 8.2**) (Joshi (1972)).

The curve YZ shows society's indifference curve between investment and consumption, and XW is the empirical trade-off curve between investment and consumption. Suppose that with no employment in industry, total consumption equals agricultural consumption (OM), and investment in industry (ON) is initially financed by agricultural taxation. As labour is then shifted from agriculture to industry, investment and consumption can both increase as long as the increase in production exceeds the increase in consumption, say to L. Beyond L, consumption can only increase by sacrificing investment at an increasing rate, until at T' investment will fall by more than consumption increases as employment increases, signifying a fall in total output. The optimal level of consumption and investment is determined where the indifference curve, YZ, is tangential to the trade-off curve, XW, at point B'. This point determines the optimal quantity of labour, L^*, which in turn determines the level of industrial output from the production function. The shadow wage is then the marginal product (P_I) at that point, given by the slope of the tangent to the production function. We illustrate this in **Figure 8.3** below. Point L in **Figure 8.3** corresponds to L in **Figure 8.2** where savings and investment are maximised. Point L_1 corresponds to L_1 in **Figure 8.2** where total output is maximised, beyond which investment falls by more than consumption increases. The optimum quantity of labour, L^*, implies a particular output and marginal product of labour which to be achieved requires that the shadow wage be set at this level ($W^* = P_I$).

Note from **Figure 8.2** that if an infinite valuation is placed on saving and investment ($S_o = \infty$), the indifference curve between investment and consumption would be a horizontal line and tangential to XW at A', giving employment level, L, which maximises investment and saving with a

Figure 8.3



shadow wage equal to the industrial wage. Conversely, if society is indifferent between the present and the future ($S_o = 1$), the *YZ* curve would be a 45° line (as shown) tangential to *XW* at *T′*, giving employment L_1 where total output is maximised with the marginal product in industry equal to the marginal product in agriculture and a shadow wage equal to the marginal product in agriculture.[1]

A Closer Examination of the Change in Consumption in Industry and Agriculture

Up to now it has been assumed that the marginal propensity to consume out of wages is unity and that all 'profits' are saved. It has also been assumed that consumption falls in agriculture to the extent of the migrant's consumption. In practice, the marginal propensity to consume out of wages may be less than unity; the marginal propensity to save out of 'profits' may be less than unity; and consumption in agriculture may not fall by the extent of the migrant's consumption. A more general formulation of the shadow wage is called for which allows for these possibilities.

The change in consumption in industry as more labour is employed may be written as:

$$C = Wc + c^* (P_I - W) \tag{8.19}$$

where W is the industrial wage; $(P_I - W)$ is 'profit' per worker; c is the marginal propensity to consume out of wages, and c^* is the marginal propensity to consume out of profits.

The change in consumption in agriculture as labour is drawn away may be written as:

$$m = d\,(1 - c') \tag{8.20}$$

where d is the consumption of the migrants from agriculture, and c' is the propensity to consume of those remaining in agriculture. Clearly if those remaining increase their consumption by as much consumption as the migrants 'release', so that $c' = 1$, agricultural consumption will not fall as labour migrates.

Substituting for C and m in the standard formulation for the shadow wage in equation (8.14), we obtain:

$$P_I = P_A + [Wc + c^* (P_I - W) - d\,(1 - c')]\left(1 - \frac{1}{S_o}\right) \tag{8.21}$$

as the optimal shadow wage (W^*).

The Valuation of Production Forgone and the Increase in Consumption

Using the Little–Mirrlees approach, the valuation of agricultural production forgone (P_A), and the value of increased consumption ($C - m$), must be measured at world prices. To value agricultural production forgone, a bundle of goods must be taken to represent the marginal physical product which then must be priced according to whether they are traded or non-traded, as described earlier. To value the increased consumption also requires taking a bundle of goods, distinguishing between traded and non-traded goods. To recap, **standard conversion factors** are recommended to reprice non-traded goods, which are calculated as the ratio of the weighted average of the world prices of all exports and imports to the value of their domestic prices.

As we saw earlier, it is generally accepted in the comparison of the Little–Mirrlees and UNIDO approaches to project evaluation that the standard conversion factor (SCF) should be the inverse of the shadow exchange rate (SER). The reason is that both approaches advocate the use of border prices to value traded goods, so while in the Little–Mirrlees method they are automatically expressed in the *numéraire*, in the UNIDO approach they need to be converted into domestic prices using a shadow exchange rate. With regard to non-traded goods, the opposite is the case and the Little–Mirrlees approach must convert the domestic prices of these goods into border prices using the standard conversion factor. As the one process is the reverse of the other, it is accepted by both methodologies that SCF = 1/SER. (see p. 200).

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[1] It should be borne in mind that the indifference curve is not strictly exogenously given. The value of S_0 is not independent of the *future* level of savings and investment, and thus the indifference curve may be expected to change its shape through time.

■ Social Appraisal

☐ *Distributional Considerations in Project Appraisal*[1]

So far we have ignored the effect of project choice on the distribution of income. The distributional consequences of projects can be included in the estimation of the shadow wage by altering the valuation of present to future consumption ($1/S_o$) – increasing the value if the consumption gain is to the poor, and decreasing the value if the consumption gain is to the rich. The distribution weighted relative valuation of present to future consumption can be thought of as being composed of two parts: (i) the value of a marginal increase in consumption to someone at a level of consumption, C, divided by the value of a marginal increase in consumption accruing to someone at the average level of consumption, $\bar{C}$. Let us denote this as:

$$\frac{W_C}{W_{\bar{C}}} \ (= d); \tag{8.22}$$

(ii) the second part is the value of a marginal increase in consumption to someone at the average level of consumption divided by the value of a marginal increase in public income (saving). Let us denote this as:

$$\frac{W_{\bar{C}}}{W_g} = \frac{d}{S_o} \tag{8.23}$$

Therefore, the distribution weighted relative valuation of present versus future consumption is:

$$\frac{W_C}{W_{\bar{C}}} \cdot \frac{W_{\bar{C}}}{W_g} = \frac{d}{S_o} \tag{8.24}$$

Up to now it has been implicitly assumed that $d = 1$ – as if it is the average man who always gains from projects or that the gains to all individuals are valued equally. If greater weight is given to the consumption gains of the poor ($d > 1$) than to the rich ($d < 1$), however, it can be seen from equation (8.21) or (8.14) that the substitution of d/S_o for $1/S_o$ will alter the shadow wage. A high d will lower the shadow price of labour and favour projects which provide consumption gains to the poor, and a low d will raise the shadow price of labour and favour projects which benefit the wealthy.

The question is: how is d determined? To derive distribution weights, a utility function must be specified. One possible utility function, with the underlying assumption of diminishing marginal utility of consumption, is:

$$U_c = C^{-n} = \frac{1}{C^n}, \tag{8.25}$$

where C is consumption and n is a parameter of the utility function. The higher n, the higher the rate of diminishing marginal utility. For example, if $n = 1$, the utility of consumption for a person with double the consumption of another ($C = 2$) is one-half; and if $n = 2$, the utility of consumption for a person with double the consumption of another is one-quarter, and so on. To compare the value of consumption to different people (or groups), some standard needs to be taken such as the average. Thus:

$$d = \frac{U_c}{U_{\bar{c}}} = \left(\frac{\bar{C}}{C}\right)^n \tag{8.26}$$

where $\bar{C}$ is the average level of consumption (and utility and consumption at the margin are inversely related).

Equation (8.26) says, for example, that the

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[1] This section relies heavily on the exposition given in Squire and van der Tak (1975).

Table 8.2 ***Values of the Consumption Distribution Weight (d) for Marginal Changes in Consumption***

Values of distribution weight (d)						
At existing consumption level (C)	*At relative consumption level ($\bar{C}/C$)*	*And when n equals*				
		0	*0.5*	*1.0*	*1.5*	*2*
10	10.00	1.00	3.16	10.00	31.62	100.00
25	4.00	1.00	2.00	4.00	8.00	16.00
50	2.00	1.00	1.41	2.00	2.83	4.00
75	1.33	1.00	1.15	1.33	1.53	1.77
100	1.00	1.00	1.00	1.00	1.00	1.00
150	0.66	1.00	0.81	0.66	0.54	0.44
300	0.33	1.00	0.57	0.33	0.19	0.11
600	0.17	1.00	0.41	0.17	0.07	0.03
1 000	0.10	1.00	0.32	0.10	0.03	0.01

Source: Squire and van der Tak (1975).

marginal utility of consumption to someone with a level of consumption of half the average ($0.5\bar{C}$) is $(2)^n$. If $n = 2$, $d = 4$. The lower the level of consumption relative to the average, and the higher n, the higher the distributional weight will be, and the greater the egalitarian bias in project selection. **Table 8.2** shows how the value of the distribution weight changes with n and $\bar{C}/C$, for representative values of n and $\bar{C}/C$ with ($\bar{C}$ = 100). The values of $\bar{C}$ and n are not project specific, but country specific, and must be provided by the planning office.

Having discussed the determination of d in equation (8.24), we must return to the valuation of S_o. We already discussed one method of valuing S_o (see equation (8.18)). We now have some independent check of whether the value of S_o is plausible. One test is to estimate, at the chosen value of S_o, the value of $\bar{C}/C$ at which the government is indifferent between its own income (saving) and consumption so that costs and benefits of increased consumption are assumed to be equal and the shadow price of labour is measured simply as the efficiency price or opportunity cost. In other words, what is the value of $\bar{C}/C$ at which $d/S_o = 1$, so that $1 - d/S_o = 0$? If S_o is assumed to be 3, then d must equal 3. With $n = 1$ (say), this required value for d implies an existing level of consumption equal to one-third of the average (see **Table 8.2**). In this case the value of S_o used by the planners would imply that the government is indifferent as between additions to its own income and additions to the consumption of those currently consuming one third of the average level. This may not seem plausible in the light of other policies. For example, the government may be distributing various forms of subsidies at this level of consumption, which suggests it values consumption more highly than public income or saving. In this case it should lower S_o and put a higher value on present consumption to give a lower shadow wage. An S_o that implied some starvation level of consumption could be immediately ruled out.

The Equivalence of the Little–Mirrlees Formulation of the Shadow Wage and the UNIDO Approach

In the UNIDO approach, the optimal shadow wage is given by

$$W^* = P_A + s^* (P^{INV} - 1) W \tag{8.27}$$

where s^* is the capitalists' propensity to save; W is the wage and P^{INV} measures the price of investment in terms of consumption. Assuming that the propensity to save of capitalists is unity ($s^* = 1$) and all wages are consumed, equation (8.27) may be written as:

$$W^* = P_A + (P^{INV} - 1)\,C \qquad (8.28)$$

where $(P^{INV} - 1)\,C$ represents the *present* value of aggregate consumption lost (assuming $P^{INV} > 1$) because of the increased consumption of workers which reduces saving for future consumption.

Now, for the two approaches to give equivalent cash flows, whichever *numéraire* is taken, P^{INV} must equal S_o, so that equation (8.28) may be written as:

$$W^* = P_A + (S_o - 1)\,C \qquad (8.29)$$

Now the Little–Mirrlees formulation of the shadow wage from equation (8.14) is:

$$W^* = P_A + \left(1 - \frac{1}{S_o}\right)(C - m)$$

which, on the assumption that $P_A = m$, may be written as:

$$W^* = \frac{P_A}{S_o} + \left(1 - \frac{1}{S_o}\right) C \qquad (8.30)$$

Comparing equation (8.30) with the UNIDO equation (8.29), it can be seen that the UNIDO formula is S_o times the Little–Mirrlees formula because the UNIDO *numéraire* is $1/S_o$ times as valuable as the Little–Mirrlees *numéraire*.

The calculation of the shadow wage will be different according to the two approaches (assuming $P^{INV} = S_o$) only to the extent that they classify goods into traded and non-traded in a different way and that the standard conversion factor (SCF) to convert non-trade goods into world prices is not the reciprocal of the shadow price of foreign exchange (P_F) to convert traded goods prices into domestic prices.

Is It Worth Valuing All Goods at World Prices?

The justification in the Little–Mirrlees approach for valuing all goods at world prices is that it avoids the use of a shadow exchange rate in order to value in a single currency some goods measured at world prices (traded goods) and others measured at domestic prices (non-traded goods). The question is how much trouble is it worth to avoid using a foreign exchange rate? Some economists feel it is a lot of trouble for doubtful accuracy because of the need to disaggregate non-traded goods into their traded and non-traded inputs which requires input–output data which do not exist in many cases. It may be just as accurate, it is argued, to convert the prices of non-traded goods into a single currency by the exchange rate appropriately adjusted for under- or overvaluation. Baldwin (1972) concludes his layman's guide to Little–Mirrlees by saying 'their essential ideas are not new and their new ideas are not essential . . . the world pricing of non-traded inputs that has caused so much argument is a tempest in a teapot. I doubt it will catch on and it will not matter much if it doesn't'! Baldwin's first prediction has not proved accurate. There are now many case studies which have used the Little–Mirrlees methodology and students are encouraged to read some for themselves.[1] In his second prediction, Baldwin may be right. Below we give a simple hypothetical example of the application of the UNIDO and Little–Mirrlees approaches assuming that the standard conversion factor and the shadow price of foreign exchange are the reciprocal of each other.

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[1] See, for example, Lal (1980), Scott, MacArthur and Newbery (1976), Stewart (1978) and the Symposium in the *Oxford Bulletin of Economics and Statistics*, February 1972.

Table 8.3 ***A Comparison of Little–Mirrlees and UNIDO Approaches to Project Appraisal***

Little–Mirrlees				*UNIDO*			
	Year 0	*Year 1*	*Year 2*		*Year 0*	*Year 1*	*Year 2*
Cost of investment (*K*)							
1. Foreign component	$ 1000			1. Foreign cost converted into Rupees at shadow exchange rate of 1.25	R 1250		
2. Local component = 1000 Rupees × conversion factor of 0.8	$ 800			2. Local component	R 1000		
Input costs (C)							
1. Traded inputs		$1000	$1000	1. Traded inputs converted into Rupees at shadow exchange rate of 1.25		R1250	R1250
2. Non-traded inputs = 1000 Rupees × conversion factor of 0.8		$ 800	$ 800	2. Non-traded inputs		R1000	R1000
Benefit flow (*V*)		$3000	$3000	Benefit flow in Rupees		R3750	R3750
Net benefit	$-1800	$1200	$1200	Net benefit	R-2250	R1500	R1500

A Simple Numerical Example Showing the Application of the Little–Mirrlees and UNIDO Approaches to Project Appraisal

Assume that world prices are measured in dollars ($) and domestic prices in rupees (R); that the shadow exchange rate is 1.25 rupees per $; that the shadow price of foreign exchange $(P_F) = 1.25$ and that the standard conversion factor for converting non-traded goods prices into world prices is 0.8, i.e. 1/1.25. Assume further that:

1 All output is exported with an annual value of $3000.

2 The cost of the investment has a foreign component of $1000 and a local (non-traded) component of 1000 rupees.

3 There are traded inputs of $1000 and non-traded inputs of 1000 rupees.

4 The accounting rate of interest is equal to the consumption rate of interest.

We can now apply our net present value formula in equation (8.1) using the two approaches. Remember that using the Little–Mirrlees approach we must convert all the prices of non-traded goods into world prices using the standard conversion factor of 0.8, and using the UNIDO approach we must convert all values at world prices ($) into domestic prices using the shadow exchange rate of 1.25. We will do the analysis for three periods only (see **Table 8.3**). We see that the results of using the Little–Mirrlees approach and the UNIDO approach will differ only to the extent that the shadow exchange rate is different from the actual exchange rate. To obtain net present value, the net benefit streams in years 1 and 2 must be discounted by the appropriate discount factors which we assume here to be the same using both approaches. Assuming a discount rate of 10 per cent we have:

Using Little–Mirrlees $$\text{NPV} = \frac{\$1200}{(1.1)} + \frac{\$1200}{(1.1)^2} - \$1800 = \$282.6$$

Using UNIDO $$\text{NPV} = \frac{\text{R}1500}{(1.1)} + \frac{\text{R}1500}{(1.1)^2} - \text{R}2250 = \text{R}353.2$$

The Little–Mirrlees result will yield the same rupee value if the actual exchange rate of dollars into rupees is equal to the shadow exchange rate of 1.25.

Little and Mirrlees conclude their own evaluation of the two approaches by saying 'there is no doubt that the two works adopt basically the same approach to project evaluation. Both treatments single out the values of foreign exchange, savings and unskilled labour, as crucial sources of a distorted price mechanism. Both go on to calculate accounting prices which will correct these distortions, and both carry out these corrections in an essentially similar manner. Both advocate DCF (Discounted Cash Flow) analysis and the use of PSVs (Present Social Values)' (Little and Mirrlees (1974)). Finally, both works advocate making explicit allowance for inequality and distributional considerations in project choice through manipulation of the shadow wage. In the UNIDO approach this is done through giving greater weight to the increased consumption of the poor than of the rich, which reduces the present value of lost consumption. In the Little–Mirrlees approach distributional considerations are taken account of by working out the value of S_o taking account of the standard of living of the particular extra workers employed, as described above.

Questions for Discussion and Review

1. What is the meaning of social cost–benefit analysis?
2. Explain how the costs and benefits of a project to society may differ from the costs and benefits to the private entrepreneur.
3. Why are the future net benefits of a project discounted?
4. Why do Little and Mirrlees choose to measure the net benefits of a project in terms of saving rather than consumption?
5. Why do Little and Mirrlees measure benefits and costs of a project using world prices rather than domestic prices?
6. How is it possible to measure non-traded goods at world prices?
7. What is the relationship between the standard conversion factor and of the shadow price of foreign exchange?
8. What factors need to be taken into account in measuring the shadow wage (or social opportunity cost) of labour?
9. Evaluate the relative merits of the Little–Mirrlees and UNIDO approaches to social cost–benefit analysis.
10. How would you measure the relative valuation of investment compared to present consumption?

Chapter 9

Development and the Environment[1]

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Introduction

The environment is vital to supporting life and providing inputs for production. Over the last three decades, there has been increasing concern about the effects of economic activity on the environment. In particular, it has been argued that economic growth has caused serious environmental damage and that the current state of the environment will constrain future economic development. The poor of developing countries are often dependent on the natural environment for their livelihood and even their continued existence. Thus, damage to the environment and the relationships between the environment and the economy are often thought to be of more importance to developing than to developed countries. **Figure 9.1**, taken from the *World Development Report 1992* (World Bank (1992)), shows how selected environmental indicators vary with economic development, as measured by *per capita* income. This chapter provides an introduction to the economic analysis of the relationships between the environment, development and the economy.

First, a simple model is developed that explains the services the environment provides for economic activity and the effects of the economy on the environment. Second, the market-based approach to analysing the interactions of the environment and the economy is examined. This approach emphasises the goal of the efficient use of the environment and considers market failures to be the main, and perhaps only, cause of market economies' difficulties in allowing for environmental concerns in economic development. Drawing on the material on social cost–benefit analysis in Chapter 8, it is shown how this approach can be used to provide valuations of environmental services and to improve the efficiency of the use of the

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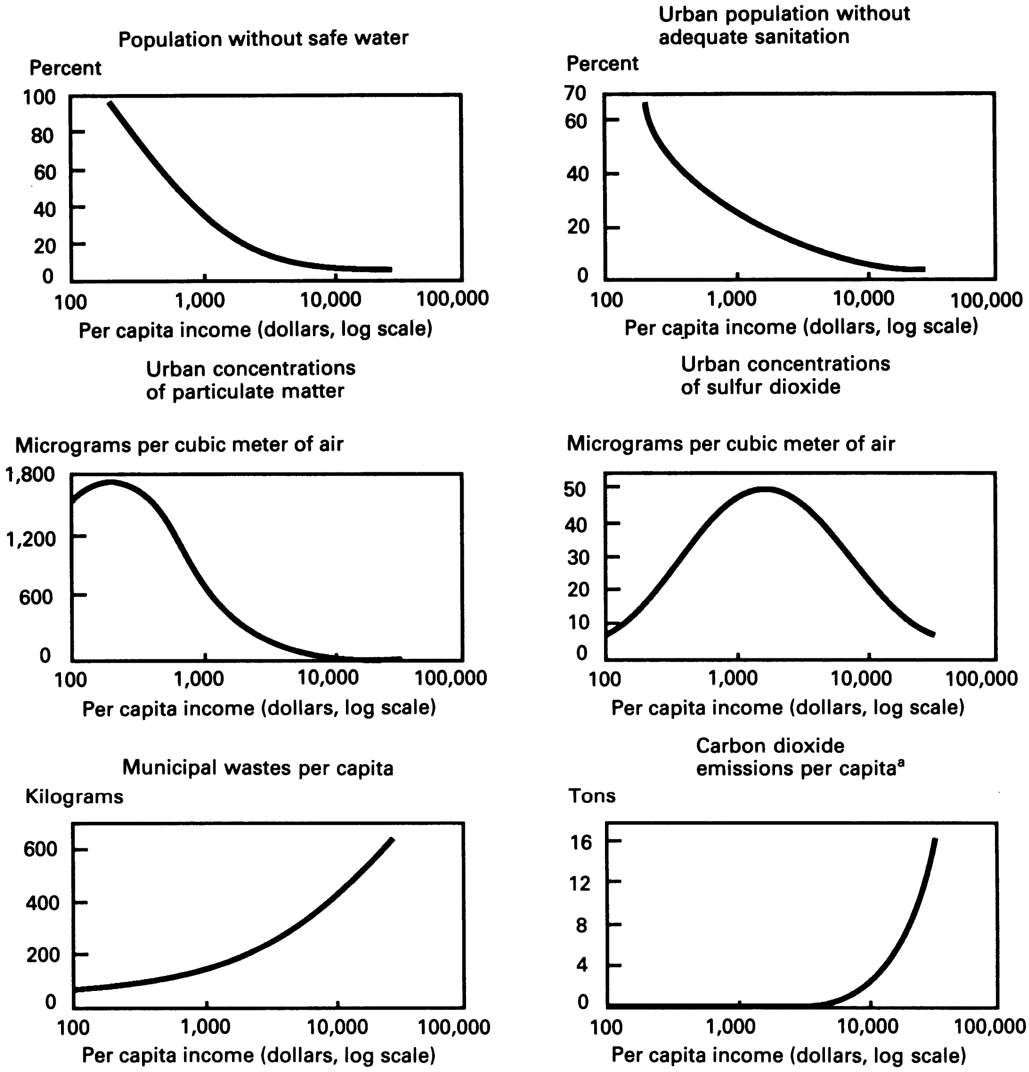
[1] This chapter has been written by my colleague Dr John Peirson. He is grateful to Michael Common and Douglas Peirson for helpful comments.

Figure 9.1 ***Environmental Indicators at Different Country Income Levels***

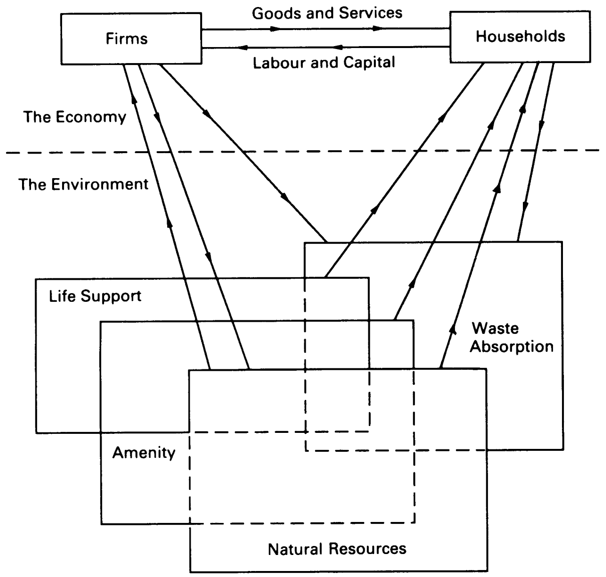


Note: Estimates are based on cross-country regression analysis of data from the 1980s.
a. Emissions are from fossil fuels.

Sources: Shafik and Bandyopadhyay, background paper; World Bank data.

environment. The neoclassical analysis of equity within and between generations is considered and its importance in the context of the environment is examined. Third, the concept of **sustainable development** is explained. This idea defines forms of development that meet the needs of the present generation whilst maintaining the potential to meet the needs of future generations. Fourth, a brief review is given of how environmentalists, economists and international agencies have approached the analysis of the environment and the economy.

Figure 9.2



Source: After figure 1.4 in M. Common, *Environmental and Resource Economics: An Introduction* (London: Longman, 1988).

A Model of the Environment and Economic Activity

There are many different models of the relationships between the environment and the economy. The simple model depicted in **Figure 9.2** illustrates the four functions of the environment in supporting economic activity and the effects of this activity on the environment.[1] These four functions are life-support, supply of natural resources, absorption of waste products and supply of amenity services. The economy is represented in **Figure 9.2** by households consuming goods and services, and firms producing with natural resources provided by the environment, and with labour and man-made capital provided by households.

The environment provides a **biological, chemical and physical system** that enables human life to exist. This system includes, for example, the atmosphere, river systems, fertility of the soil and a diversity of plant and animal life. These environmental services are consumed by households and are essential to life. Large reductions in these services, e.g. through major damage to the ozone layer, could have catastrophic consequences for life.

The environment provides **raw materials and energy** for economic production and household activity. These natural resources are either renewable, e.g. forests and fisheries, or non-renewable, e.g. minerals. Renewable resources can be used in a sustainable manner, though excessive use or mismanagement can result in the complete loss of the resources, e.g. desertification following deforestation. The ability to use renewable resources sustainably and to increase the stock of renewable resources is represented in **Figure 9.2** by the flow from Firms to Natural Resources. However, the use of a non-renewable resource reduces the finite stock of the resource forever.

The **waste products** of economic and household activity are absorbed by the environment. This sink function allows much of such waste to be disposed of safely. However, there are certain wastes which it is difficult or impossible for the environment to dispose of safely, e.g. long-lived radioactive materials and heavy metals. Other arrangements should be made for such waste. The ability of the environment to absorb waste is not infinite. For example, the natural breakdown of effluents in the sea and rivers will not give rise to serious pollution as long as the discharges are below some threshold levels, but above these levels discharges will give rise to rapid increases in pollution.

The environment also provides **amenity services**, e.g. natural beauty and space for outdoor pursuits, which are consumed, but they are not crucial to the continued existence of life.

Parts of the environment may serve more than one function: e.g. the oceans are important in determining the global and micro climates; they are sources of many minerals and other resources; they assimilate many different wastes; and they provide the space and opportunity for marine pastimes. Thus, in **Figure 9.2**, the four blocks representing the different functions of the environment overlap. The functions of the environment may be competitive. For example, excessive discharges of waste materials into the oceans will reduce their capacity to provide a habitat for fish stocks. Alternatively, environmental functions can be complementary. For example, appropriate forestry policies can provide a sustainable source of timber (a natural resource function) and reduce soil erosion (an improvement in the life-support function).

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[1] This discussion of the relationships between the environment and the economy is very general and simple. Specific examples of the interaction of the environment and the economy in developing countries can be found in Pearce *et al.* (1990), Winpenny (1991) and Dixon *et al.* (1988).

The Market-Based Approach to Environmental Analysis

The market-based approach to environmental analysis has probably been the dominant view of the relationship between the environment and the economy.[1] In particular, many environmental policies and much analysis are based on the view that markets may not function efficiently with regard to the environment and that the state has a duty to intervene and correct market failures. The underlying assumptions of the market-based approach are examined and various applications to the environment are considered.

The market or neoclassical approach to economics is concerned with how scarce resources are allocated in a market economy.[2] Allocation is assumed to take place on the basis of consumers' preferences, the distribution of economic assets and the costs of production. It is assumed that each consumer is rational and decides to purchase goods and services on the basis of prices and economic assets, which include labour income. It is assumed that the value which a consumer places on additional consumption of a good declines with increasing consumption. Economic rationality dictates that consumption of a good continues up to the point at which the value placed on an additional unit is just equal to the price. Further expenditure on the good would be inefficient, as greater value could be obtained from using the additional expenditure to purchase more preferred goods and services. Similarly, less expenditure is inefficient, as greater value could be obtained by purchasing more of the good and fewer less preferred goods and services. Thus, the neoclassical model assumes that economic rationality gives efficiency in consumption.

The neoclassical view assumes that firms are profit maximisers. This implies that firms minimise costs. This gives efficiency in production.

Finally, it is assumed that competition among firms forces them to charge prices that are equal to their marginal costs of production. As consumption decisions are based on prices, the equality between prices and marginal costs means that these decisions are based upon the marginal costs of production. This ensures efficiency between consumption and production.

The neoclassical view has various important implications for the analysis of the relationship between the environment and the economy. First, it is implicitly assumed that the value of consumption is determined by the individual consuming the good. The value of consumption is not determined by the state or some higher authority. Additionally, it is assumed that individual consumers and producers do not consider the effects of their decisions on other economic agents. Second, economic rationality implies that the value of marginal consumption of a good or service can be measured by price. Third, the neoclassical analysis of the market is based upon considering small changes in consumption and production. This view extends to the neoclassical view of the environment. Fourth, the outcome of a market economy, in terms of prices, quantities and the distribution of economic welfare, depends on the initial distribution of economic assets. Different distributions or reallocations of assets give different outcomes. It is frequently pointed out that under certain conditions the operation of the market may be efficient, but it may not be equitable. It may be possible to assess the efficiency of a market economy in an objective manner, but evaluation of the equity of a market outcome is a value judgement.

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[1] For a good introduction to this subject, see Common (1988).

[2] Explanations of the neoclassical approach to economics can be found in most intermediate microeconomics textbooks: see Laidler and Estrin (1989) and Varian (1990).

■ Externalities

The idea of externalities can be used to analyse many, but not all, types of environmental degradation. Externalities occur when the actions of one economic agent affect other economic agents and the actions are not controlled through the operation of the market. Externalities have two related causes: lack of individual property rights, and jointness in either production or consumption (see Boadway and Bruce (1984)). Individual property rights are exercised over goods, services and factors of production and allow markets to function efficiently. With a complete set of individual property rights, all the effects of an action are controlled by the market, since consumption of a good or service and use of a factor require payment to the owner. Beneficial or positive externalities are likely to be under-supplied by a market, and negative externalities are likely to be over-supplied. For an externality to continue to exist, it is usually presumed that jointness in either production or consumption is involved. The idea of an externality is explained in the following example.

It has been suggested that man-made environmental degradation in the Nepalese highlands, especially over-grazing of land, has led to soil erosion, reduced soil fertility, the transport of sediment that silts up rivers and the greater run-off of water. In particular, it has been argued that these man-made effects have contributed to flooding in the plains of Bangladesh and Northern India.[1] This environmental degradation is caused by the actions of many individual inhabitants of the Nepalese highlands. These actions may have unintended but disastrous consequences for people living in lower-lying areas. The costs imposed on these latter people are not considered by the inhabitants of the highlands. These effects are definitely not controlled by the operation of the market. In general, most economic activity in the highlands is not conducted through cash markets. The over-grazing of land is a negative externality.

This externality is caused by jointness of production and lack of individual property rights. The over-grazing of land results in the production of animals and gives rise to soil erosion, reduced soil fertility, silting-up of rivers, depositions of sediment in reservoirs and lakes, greater run-off of water and increased risk of flooding – i.e. there is jointness in production.

The economic cause of this externality is less clear and, in general, the economic analysis of the over-grazing of land is a complex issue. The analysis of the interests of farmers and the inhabitants of low-lying areas is considered first (hereafter referred to as the farmers and the inhabitants). In the next section, over-grazing in the context of just the interests of farmers is examined. A simple model is developed that compares the interests of the farmers and the inhabitants (see **Figure 9.3**). The grazing of the land in the highlands is of benefit to the farmers as a group, since it allows the production of animals. Thus, the environmental degradation inherent in anything but low-level grazing is of benefit to the farmers. This is represented by a marginal benefit curve (*MB*) that is assumed to be downward sloping. The marginal benefit is measured in dollars. The downward slope of this curve can be justified by grazing taking place on increasingly less productive land, the value of a marginal increase in output declining with increasing output and any environmental effects that bear on the farmers, e.g. soil erosion and reduced soil fertility.

The environmental effects of grazing on the inhabitants are generally negative and are listed above. These effects give rise to a net cost for the inhabitants and this is represented by an upward-sloping marginal cost curve (*MC*). These costs are

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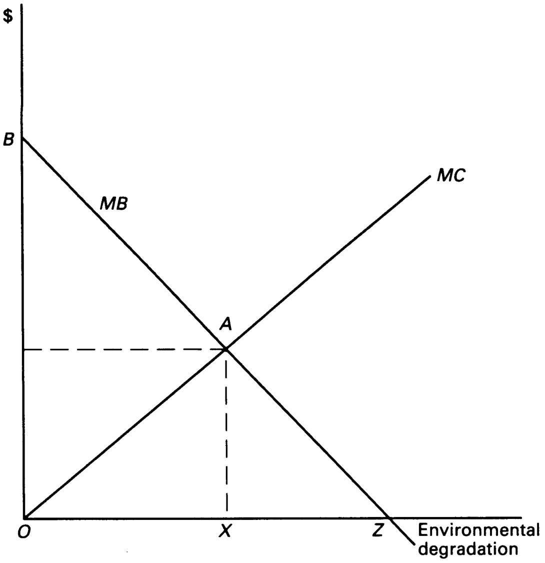
[1] There is a consensus on a human contribution to this environmental degradation and flooding, but its extent is disputed: e.g. see Blaikie (1989); Environmental Resources Limited/MacDonald Agricultural Services Limited (1989); and Pearce *et al.* (1990).

Figure 9.3



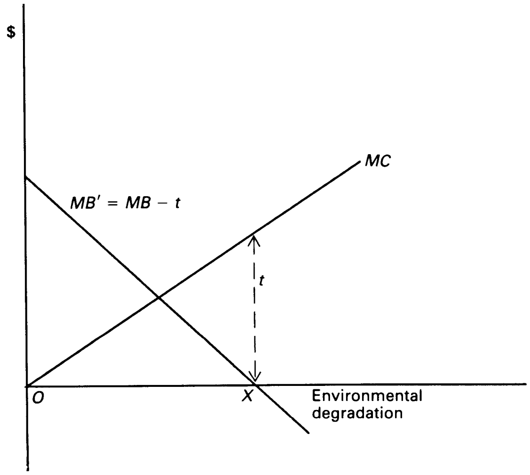
measured in dollars. The upward slope can be justified by the difficulty the environment has in withstanding high levels of environmental degradation, but its resilience to low levels of degradation.

The neoclassical view is that there is an optimal level of environmental degradation at which the marginal benefit is equal to the marginal cost, point *X* in **Figure 9.3**. Whether this level of degradation is small or large depends on the shape of the marginal benefit and cost functions. This conclusion considers environmental effects purely from the point of view of efficiency. However, it should be remembered that the outcome *X* may be efficient, but if the costs imposed on the inhabitants are relatively large, the implied distribution of welfare may not be desirable.

The operation of a market economy is unlikely to lead to the efficient outcome. The inhabitants' environment is being degraded by the actions of the farmers. In an economy with a complete set of individual property rights over all economic assets, the inhabitants or the farmers would own the property rights to the environment. If the inhabitants owned the rights, the farmers would have to pay to be allowed to degrade the environment. In the case of the farmers owning the rights, the inhabitants would have to pay the farmers to restrict environmental degradation. In reality, such property rights are likely to be ill-defined, particularly across national boundaries. It might be expected that no market controls this environmental degradation. Farmers are likely to continue degrading the environment until the marginal benefit to farmers of degradation is zero, point *Z* in **Figure 9.3**.

This analysis is one of market failure. A conventional reaction to market failure is to suggest the intervention of the state to secure a more efficient outcome. There are three feasible policies that have been suggested as solutions to this type of externality problem: **Pigovian taxes and subsidies** (named after the famous Cambridge economist A. C. Pigou); **Coasian bargains** (named after the Nobel-Prize-Winning economist Ronald Coase); and **administrative action and legislation** (see Boadway and Wildasin (1984)). The Pigovian tax solution imposes an environmental-use tax on the farmers of the value of the marginal cost of degradation at the point of the optimal outcome *X*. This forces the farmers to take account of the costs they impose on the inhabitants. This is shown in **Figure 9.4**, where the farmers face a new marginal

Figure 9.4



benefit of environmental degradation schedule (*MB'*) that includes the tax. Farmers will, out of self-interest, choose the efficient level of degradation. A Pigovian subsidy could be given to farmers to reduce environmental degradation and a similar solution occurs. However, the Pigovian solution suffers from a number of problems. First, it is very difficult to quantify and value the costs and benefits of environmental degradation (this point is returned to later). The benefits and costs are not likely to be uniform across the whole of Nepal and this implies the complication of different tax rates. Second, the majority of farmers are not part of the cash economy and the state is unlikely to be able tax and regulate farmers or afford the cost of subsidies. A recent study concluded that the environmental problems in the Nepalese highlands are unlikely to be solved by taxation and pricing policies.[1]

The Coasian bargain solution assumes that individual property rights are established and economic agents bargain to an efficient outcome. If individual property rights over the environment are given to the inhabitants, then farmers have an incentive to bargain and pay to be allowed the right to degrade the environment, as their marginal benefit exceeds the inhabitants' marginal cost at the origin in **Figure 9.3**. The potential efficiency gains of this bargaining are represented by the area *OAB*. Similarly, if the farmers are given the property right, there are incentives for the inhabitants to pay the farmers to reduce degradation from the point *Z*. The Coasian solution suffers from the major problem of how property rights are established. Additionally, there are incentives for individuals to **free ride** on the contributions that others make to reduce externalities. It is difficult to see how bargains can be enforced when there are many farmers and inhabitants.

Pollution permits are examples of the establishment of property rights by the state selling the right to pollute the environment. Again, it is unlikely that this policy would be relevant to the present example as the farmers are very poor and would be unlikely to participate in a market for licences. The selling of permits may give the least-cost method of reducing environmental degradation, but to give an efficient level of degradation requires the state to estimate the marginal cost function in **Figure 9.3**. It would be difficult for the state to assess the physical effects of degradation and place economic values on these effects.

The most notable example of an environmental agreement that could be interpreted as a Coasian bargain is probably the Brazilian Tropical Rainforest Fund Agreement signed in December 1991. This agreement recognises the importance to the world of the Amazon rainforests. A number of the major industrial countries agreed to contribute to a fund, run jointly by the Brazilian government, the World Bank and the European Community Commission, to conserve the Brazilian rainforest (World Bank (1992)).

The third solution to the externality problem is administrative/legal action. This approach takes action to ensure that the externality is reduced to a lower level. The usual examples of this solution are fixed standards backed up by legal sanctions, e.g. maximum allowable levels of environmental degradation. The actions taken by government and aid agencies to deal with the environmental problems in Nepal have taken many forms. These measures have included population and migration control to reduce the pressure on land, soil and watershed management and encouragement of non-farm economic activities. These measures are practical, but do not have the theoretical elegance of the two previous solutions.

The one major problem facing all solutions to the problem of dealing with externalities is in assessing their physical nature and calculating their economic value. The uncertainty surrounding environmental effects and their economic value is discussed in a later section.

■ Common Property Rights

The common ownership of a renewable resource is likely to lead to an important externality. Such circumstances are frequently referred to as **the**

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[1] See Environmental Resources Limited/MacDonald Agricultural Services Limited (1989).

tragedy of the commons. However, Dasgupta has forcefully argued that there has been considerable confusion over the economic analysis of this problem.[1] The analysis is considered in terms of the previous example of Nepalese farmers over-grazing their cattle, buffalo, sheep and goats on land whose access is open to all – i.e. there is a common property right.

The rational individual farmer will use common land without regard to the cost this use imposes on other farmers. This behaviour is a negative externality and is inefficient. The costs imposed on other farmers are soil erosion and exhaustion of the soil. Both these effects will decrease the future value of the resource to farmers. In this sense, the problem of the commons is an **intertemporal externality.** However, it is not the case that free open access to grazing land necessarily destroys the usefulness of the land. The extent of over-grazing depends on the private costs of rearing animals, their market value and the ability of the land to support large numbers of animals. However, appropriate co-operative action by farmers to reduce over-grazing would increase the economic welfare of farmers as a group. In Nepal, a lot of pasture land is owned by the government, but is used as open access land. There is some evidence that protection of common land and co-operation amongst farmers has dramatically increased the productivity of land.

■ The Discount Rate

Degradation of the environment reduces the supply of environmental services in the future. The economic analysis of the environment requires a means of comparing the benefits and costs of environmental effects in the present and the future. This comparison is usually made through a weighting device called **the discount factor** (see Chapter 8). The practice of discounting environmental costs and benefits has caused much confusion and dispute.

In a neoclassical model of the behaviour of individual economic agents with finite lives, the discount rate is simply the market rate of interest. The level of the market rate of interest is the outcome of the preferences of individuals for present consumption over future consumption and the physical possibilities for transforming present consumption into future consumption. Even with a set of perfect capital markets, the resulting intertemporal allocation of resources is unlikely to be socially efficient for a number of reasons.

First, the outcome of perfect capital markets reflects the preferences and actions of those presently alive. All individuals will eventually die and presumably value their own consumption more highly than their descendants. This implies the market outcome may underweight the consumption of future generations. It might be argued that the state should decide upon a distribution of economic welfare over time that favours future generations more. Alternatively, it has been argued that technical progress will increase future income and fairness requires redistribution from future generations to the present. However, it is unclear how the state can easily decide which distribution should be preferred (see Boadway and Bruce (1984)).

Second, even with regard to the preferences of the present generation, the market outcome may be inefficient. The present generation may wish to save for the benefit of future generations. This can lead to two types of market failure called the **assurance problem** and the **isolation paradox** (see Sen (1967)). Both phenomena are examples of externalities. The assurance problem concerns saving by one individual for future generations that benefits all other individuals in the present who place value on the consumption of future generations. Thus, the market aggregate level of saving is inefficient and the market rate of interest undervalues future consumption. Aggregate saving would be increased if individuals were assured that their additional savings would be matched by other altruistic individuals.

The isolation paradox concerns the value individuals place on the their descendants' consumption compared with that of the rest of future generations. If the return from saving for the benefit of future generations cannot be captured entirely by an individual's descendants then it is likely that even perfect capital markets provide an inefficient level of saving.

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[1] See the discussion of 'the problem of the commons' in Dasgupta (1982).

Imperfections in the capital market are widespread and there is no unique interest rate or discount rate. Instead of the use of an observed market interest rate, the social opportunity cost of capital has been used as a measure to discount the future. The social opportunity cost of capital measures the social value of a loss of one unit of capital in the economy to fund the proposed investment. By definition, the social opportunity cost of capital is a correct measure, but difficulties arise in calculating an appropriate index.

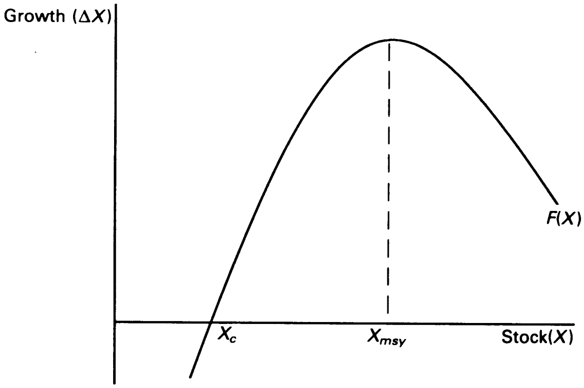
The effect of the discount rate on environmental degradation is unclear. A low discount rate weights future consumption more heavily and might be thought to give a better future environment than a higher rate. However, most investments have costs at the beginning of their life and benefits thereafter. Thus, a lower discount rate will make these investments appear more attractive as weighted future benefits will increase relative to present costs (see equation (8.1)). Increased investment and the consequent economic growth may lead to more environmental degradation.

The Harvesting of Renewable Resources

Renewable resources are those whose stock is capable of growth as well as depletion. Renewable resources are usually thought of as experiencing growth through a biological process. Fisheries, forests and the previous example of common pasture land are all examples of renewable resources. The neoclassical analysis of renewable resources considers efficient harvesting, whilst biologists are often concerned with the **maximum sustainable yield** (MSY) that can be obtained from the resource. These two ideas are examined in the context of a fisheries example.

The growth of the stock of fish, ΔX, depends on the stock, X. This relationship is shown in **Figure** 9.5. Below a critical level X_c, the stock is in danger of terminal decline as it is not capable of replication. The existence of a critical level may be explained by difficulties in finding a mate. Above this level, the growth is positive. Eventually, the growth declines because of competition for food supplies or the effects of predators. The MSY occurs at the point of greatest absolute growth.

Figure 9.5



The efficient use of the fish stock is examined by considering a simple model in which harvesting is costless. The objective is to maximise the social value of the stock over time. The social gain is examined from reducing harvesting of fish and allowing the present stock to increase by one unit. The present marginal social value of one unit of fish is denoted by v, where v is a function of time. The marginal productivity of the stock, $F'(X)$, represents the physical gain in growth from increasing the stock by one unit. The social value of this gain is $v\ F'(X)$. The marginal social value of an additional unit of fish in the second period is $(v + \Delta v)$, where Δv is the change in social value between the first and second periods. With a discount rate of r, the present value of an additional unit of stock in the next period is

$$\frac{v\ F'\ (X) + (v + \Delta v)}{1 + r} \tag{9.1}$$

The marginal social value of consuming one unit of fish in the present period is v. Thus, if equation (9.1) exceeds v, an increase in social welfare can be obtained by reducing the level of harvesting. This condition can be written more simply as

$$F'(X) + \Delta v/v > r \qquad (9.2)$$

This condition has a simple interpretation. If the marginal productivity of the stock plus the proportionate gain in the value of the stock over time exceeds the discount rate, then it is efficient to reduce harvesting. A reduction in the harvest increases the stock which is likely to decrease $F'(X)$ (see **Figure 9.5**). A reduction in the harvest means consumption will fall and marginal social value of present compared to future consumption increases. These two effects may be expected to give equality in equation (9.2) and, thus, equilibrium.

The equation (9.2) has two important implications. First, the efficient outcome is not the same as the MSY, as the latter is given by $F'(X) = 0$. Second, for species that have a low marginal productivity of stock and whose value does not increase appreciably with a decreasing stock, extinction may be an efficient outcome!

The present analysis is concerned with maximising the social value of the fishery stock over time. It is appropriate to consider whether the efficient outcome can be achieved through a market system. The fisheries example is another case of common property rights. In the discussion of common property rights, it was seen that it can be difficult to establish individual property rights for renewable resources such as fisheries, forests and pasture land. Thus, the market use of such renewable resources is likely to be inefficient.

If the property rights for the resource are given to a few individuals, this will affect the distribution of economic welfare and will result in monopoly power. Private monopoly control of a renewable resource may result in its inefficient use, as marginal (private) revenue rather than social value would appear in equation (9.2) and, in order to maximise profits, the monopolist would restrict the use of the resource below the efficient level.

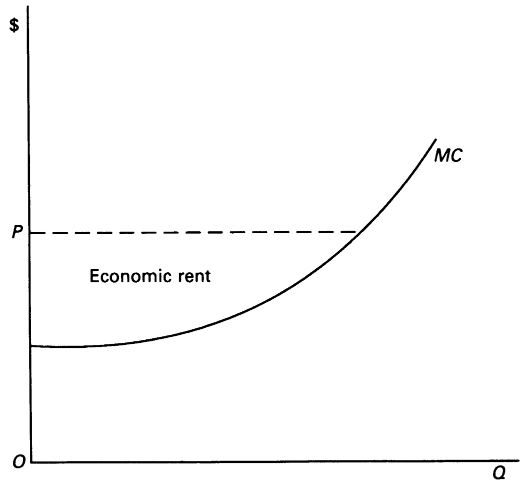
Non-Renewable Resources

Non-renewable resources cannot be regenerated over time. The present use of one unit of such a resource prevents it being used in the future. The finite levels of these resources means that they are often referred to as exhaustible resources. This suggests that non-renewable resources should be used with care.

There are many estimates of the stocks of non-renewable resources. The calculation of the known reserves of a non-renewable resource has to be made in the context of the extraction cost and the price of the resource. It is considered inappropriate to include in estimates of reserves sources for which the cost of recovery exceeds the current price or for which there is no known proven extraction technology. Proven reserves refer to those sources that are presently known. It is likely that there are sources yet to be discovered. However, uncertainty means that it is difficult to calculate meaningful estimates for unproven reserves.

The depletion of a non-renewable resource can be analysed in terms of the objective of maximising the social value of the stock. **Figure 9.6** considers a one-period model and the maximisation of the economic rent from extracting a mineral that has a price P. The economic rent is the area be-

Figure 9.6



tween the price and the marginal cost curve. If the price represents the marginal social value of the mineral and the marginal cost curve is the same as that for the marginal social cost, then the two objectives are the same.

The **optimal depletion** of a non-renewable resource over time can be analysed in a very similar manner to the harvesting of a renewable resource. Again the objective is taken as the maximisation of the social value of the stock over time. The decision to extract a non-renewable resource is simpler in that there is no marginal product of the stock to consider. It is assumed that the extraction of the resource is costless. The resource should be further conserved if

$$\frac{\Delta v}{v} > r \tag{9.3}$$

Equation (9.3) has a simple interpretation. If the relative appreciation of the social value of the resource is greater than the discount rate, then mole of the resource should be saved for the future.

For an efficient outcome, the social value of marginal consumption should be increasing at the rate r. This implies (through integration) that v is given by the function $v_o e^{rt}$, where v_o is the social value at time zero. If a constant marginal cost of extraction (*mc*) is introduced into the analysis, the efficient outcome gives a final equation (the v_o has to be redefined)

$$v(t) = mc + v_o e^{rt} \tag{9.4}$$

Equation (9.4) reflects the optimal depletion path. It is possible for a perfect market to give this outcome. In this case, the optimal price path is given by

$$p(t) = mc + r_o e^{rt} \tag{9.5}$$

The $r_o e^{rt}$ term is referred to as the discounted rental premium. It can be interpreted as the social cost of consuming the resource in the present rather than in the future.

As before, private monopoly ownership will restrict the use of the resource below the efficient level.

It has been pointed out by Kay and Mirrlees (1975) that, for reasonable discount rates, one would expect the optimal price to be close to marginal costs for most of the lifetime of a resource.

■ Other Values

It is a central tenet of neoclassical economics that prices should reflect the marginal costs of production. In a competitive economy, prices may reflect private marginal costs, but there are a number of other types of social costs that should be taken into consideration. First, the external costs imposed on other individuals should be taken into account.[1]

Second, the economic rent in the use of non-renewable resources should be included in social marginal costs. As noted before, the economic rent can be regarded as a premium that has to be paid for the use of the resource in the present rather than in the future.

There are three other types of values that have not yet been considered: **option, quasi-option** and **existence values**. An option value is the value placed on an option that allows use to be made of the environment in the future. The option is not necessarily taken up, but it gives value. An example of an option value is **biodiversity**. Protection of species of animals and plants may be desired in order to allow possible future uses of these species as inputs to production and because many individuals may wish to have the opportunity of seeing these species in the future. Quasi-option value is the value placed on an option given an expectation that there will be increases in knowledge. For example, the value of certain plant species may depend on the development of knowledge of new uses of the plants.

Existence value is the value placed on a good or service independent of any actual or possible future consumption. This value is different from the other types of values in that it is unrelated to use. An example of existence value is the concern expressed by many individuals for the preservation of the tropical forests, even though they are unlikely to ever see, at first hand, or use this resource.

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[1] The remaining values could strictly be classified as private or external costs, but for the purpose of exposition they are separated out into separate categories.

Thus, the total economic cost should be composed of six components

$$\begin{aligned}\text{Social Cost} = {} & \text{Private Cost}\\ & + \textstyle\sum \text{External Cost}\\ & + \text{Rental Premium}\\ & + \text{Option Value}\\ & + \text{Quasi-option Value}\\ & + \text{Existence Value}\end{aligned} \qquad (9.6)$$

Efficient allocation requires the consideration of all six components of social costs.

Measuring Environmental Values

The analysis of this chapter suggests that a market economy will not value all aspects of the environment appropriately. This view is widely held and has led to much intellectual and practical effort being applied to the problem of how to introduce appropriate environmental values into economic decision-making. The following discussion considers the introduction of environmental considerations into social cost–benefit analysis and national income accounting.

Appraisals of many investment projects in developing countries now include **Environmental Impact Assessments** (EIAs) that estimate the environmental effects of the projects. This should be the first stage of the introduction of the environmental effects of a project into social cost–benefit analysis. Often it is very difficult to assess a project's physical effects on the environment. For example, models of the effects of emissions of carbon dioxide on warming of the earth have given quite different predictions (see, for example, Dornbusch and Poterba (1991)). Another example is the previously referred differences in views about the importance of man-made and natural determinants of flooding in Northern India and Bangladesh. EIAs can rarely firmly establish the type and extent of environmental effects of projects. Thus, the introduction of previously unconsidered environmental effects into economic decision-making should take account of this uncertainty.

Once the environmental effects of a project have been estimated, there are three approaches to placing economic values on the effects.[1] First, the basic valuation technique in social cost–benefit analysis is to use market prices. This is justified by the neoclassical assumption that prices reflect the value of goods and services. In the case of environmental effects in developing countries, markets and prices may not exist for many of the effects that require valuation. For large environmental effects, the project may actually alter prices. In this case, the changes in the values placed on environmental effects should be modelled. In practice, this is often impossible.

The second approach calculates the value of environmental effects indirectly through observed economic behaviour. Within this approach, there are a number of different techniques. One is the **preventive expenditure technique** which takes the expenditure that people are prepared to undertake to prevent degradation as a measure of the value of the environment effects. Another is the **replacement cost technique** which estimates the expenditure people are prepared to undertake to restore the environment to its previous state after degradation has occurred.[2] These techniques can be very similar. The full long-term consequences of environmental effects may not be understood. Not all environmental effects can be fully offset by preventive expenditure and the environment cannot always be restored after degradation. Such problems may be particularly important for large changes in the environment, e.g. changes in the ecology of a large watershed and global warming.

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[1] More precise details and discussion of economic valuation can be found in Winpenny (1991) and Dixon *et al.* (1988).

[2] These expenditures and costs may be difficult to observe and both techniques often use experts to estimate them.

The ability of the population to fund these expenditures may be limited by imperfect capital markets. For these reasons, it is usually thought that the two techniques may underestimate environmental costs.

In the absence of a market for an environmental effect, it is sometimes possible to derive the value placed on the effect by the prices paid for other goods and services which implicitly value the effect. For example, property values vary with location and this may in part reflect differences in the environment. The method of hedonic prices can produce estimates of the contribution of differences in the environment to the prices of property. This can be used to give an estimate of the implied value of certain environmental qualities. In developing countries, there are often significant imperfections in markets, e.g. rent controls, which affect the validity of the technique. The hedonic price method requires large amounts of data. It is often difficult to measure the environmental quality that is being considered. The importance of the environmental variable may not be properly understood by individuals. These problems limit the usefulness of this technique, particularly in developing countries.

The **human capital technique** values environmental effects by their effect on human health. This is measured in terms of lost economic production and increased health-care costs. The effects of the environment on health are not known with certainty. The technique does not value the ill health of the unproductive and the psychic costs of ill health.

The **travel cost method** values the time and costs that people are willing to incur in travelling to areas with more pleasant environments. Thus, the method gives an implied value of environmental quality. The formal assumptions of the model and its applicability to developing countries have been criticised (see Winpenny (1991)). The method implicitly considers the environment in terms of provision of recreational services rather than basic life-support services.

The final approach to valuing environmental effects is that of **contingent valuation.** A subset of the population is surveyed and is asked directly their valuation of the environment. There are two ways in which this question can be asked. Individuals can be asked either their willingness to pay for an environmental benefit or their willingness to accept compensation for a loss of environmental quality. Standard economic theory implies that the two questions should receive the same answer. In practice, there are typically large differences in the valuations produced from willingness to pay and willingness to accept compensation surveys. The questions in this approach are hypothetical – no payments are actually made. If respondents believe that they can affect the outcome of decisions by their answers, they may attempt to reply in a strategic manner. It is not always clear how to gross up the response from a survey to represent the general population's valuation of an environmental effect. The responses of individuals may reflect the context of the survey question. Thus, for example, individuals could, with appropriate questions, be induced to respond as citizens concerned with the public interest rather than consumers pursuing their own self-interest.[1]

In Chapter 8, the importance in social cost–benefit analysis of the distribution of costs and benefits was considered. There are many environmental effects that imply major changes in the distribution of economic welfare, e.g. the resettlement of an indigenous population following the construction of a dam. The distribution of environmental benefits and costs can affect the desirability of a project. Simple social cost–benefit analysis is concerned with improving the efficiency of economic decision-making. The prices used in social cost–benefit analysis reflect the distribution of welfare. If this distribution is unfair, the use of the resulting prices may be inappropriate. The introduction of distributional issues means that value judgements have to be made explicitly.

The valuation of environmental costs is essential to improving economic decision-making on the environment and social cost–benefit analysis has developed various techniques to this end. However, there remain theoretical and practical problems with the use of these techniques.

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[1] See Sagoff (1988) for a discussion of this view.

■ National Income Accounting

The neoclassical approach to economic analysis assumes that consumption in its widest sense is, and should be, the objective of economic activity. The ethical issues concerning whose consumption should be considered were examined in Chapter 6 on population. The conventional approach is to measure economic welfare in terms of *per capita* income. This approach has been widely criticised and alternative measures have been proposed, many of which emphasise the importance of accounting for the environment.

Measures of economic welfare have to be judged in terms of their theoretical definition and their practical application. The most obvious measure of current economic welfare is *per capita* current consumption (see Lecomber (1978)). Current consumption can be increased by reducing investment and, thus, future consumption. This suggests that economic welfare in one period should be defined relative to a fixed capital stock. Thus, additions to capital stock, though not increasing current consumption, should be reflected in a measure of economic welfare as they allow increases in future consumption. This idea underlies the conventional definition of income (see Hicks (1946)).

There are many conceptual and practical problems in the definition of income (see Lecomber (1978) and Anderson (1991)). Only those directly concerned with accounting for the environment are examined here. Environmental degradation can be mitigated by the actions of economic agents, e.g. soil erosion can be reduced by planting forests. In national income accounts, such **defensive expenditures** are taken as giving rise to increases in economic welfare rather than as attempts to maintain the environment. It is commonly argued that these expenditures should be excluded from measures of economic welfare and account be taken of the environmental effects that give rise to these expenditures.

Environmental degradation affects economic welfare as individuals directly consume environmental services, e.g. unpolluted air. As there is not always a market in such services or only an indirect one, they are not recorded in national income accounts. Degradation also reduces the productive potential of the environment, e.g. non-natural causes of soil erosion and reductions in the ability of the environment to absorb waste products. Reductions in the productive potential of the environment are examples of the depreciation of the stock of natural capital. These types of changes are not recorded in national income accounts.

The use of non-renewable resources, e.g. fossil fuels, is not allowed for in a correct manner in national income accounts. These resources are part of the natural capital of the environment. Their use in the present reduces the supply available for future generations. National income accounts consider the use of non-renewable resources as a simple productive activity. It should also be considered as a depreciation of natural capital.[1]

There have been two responses to the failure of national income measures to account for the environment. The first method follows Nordhaus and Tobin's calculations (1972) of **measures of economic welfare**, that attempt to recalculate national income accounts allowing for environmental effects. These calculations are speculative and omit various environmental effects. Nordhaus and Tobin estimated defensive expenditures and loss of certain environmental services to represent 23 per cent of American GNP in 1958. More important, these aspects of economic welfare were estimated to have deteriorated substantially over the period 1929–65. A more recent study (Repetto *et al.* (1989)) for Indonesia estimated an environmentally adjusted annual economic growth rate of 4 per cent for the period 1971–84 compared with the GDP growth rate of 7.1 per cent. The environmental adjustment allowed for various changes in petroleum, forest and soil natural capital. Thus, allowing for the environment can give quite different estimates of economic welfare and economic growth.

[1] In the case of renewable resources, a similar analysis applies, as regeneration can require time and investment and, thus, present consumption of renewable resources can impose costs on future generations.

Another method of accounting for the environment in economic growth is to construct physical, rather than monetary, accounts of the environment. These accounts divide up the environment into different sectors and estimate the changes that have taken place over time. For example, the use and discovery of mineral and energy resources would be recorded. The quality of air would be represented by the levels of different types of air pollution. Norway, France and, more recently and to a lesser extent, America and Canada have produced physical environmental accounts.

The two methods of accounting for the environment are not substitutes. The monetary approach first requires the calculation of physical accounts. Physical environmental accounts are useful for considering ecological and environmental issues. Monetary environmental accounts are useful as they reduce all effects to a common measure and estimate a net figure for the use of the environment. However, because of the difficulty of doing this, they have been criticised on theoretical and practical grounds.

■ Risk and Uncertainty

Risk exists where there is doubt about the outcome of the future and it is possible to estimate objective probabilities of the occurrence of the different possible future outcomes. The outcome of a throw of a dice is an example of risk. Uncertainty exists where there is doubt about the outcome of the future and it is not possible to estimate objective probabilities of the occurrence of the different possible future outcomes. The outcome of a throw of a die is an example of risk. Uncertainty exists where there is doubt about the outcertain future events. It is difficult to analyse uncertain events and most environmental analysis that considers risk and uncertainty assumes, either explicitly or implicitly, that it is possible to estimate probabilities with some degree of objectivity – i.e. the circumstances are assumed to be those of risk rather than uncertainty.

Uncertainty about the relationship between the environment and the economy complicates analysis. As previous examples have shown, there is scientific dispute about many important environmental effects. In the analysis of environmental policies, it is possible to distinguish two approaches to managing this uncertainty.

First, the different possible outcomes of a policy are predicted. Then probabilities are estimated for these different outcomes, though these probabilities are necessarily subjective. It can be argued that the notion of estimating probabilities for events like global warming is not appropriate, as they cannot be considered as repeated probabilistic events like the throwing of a die. Notwithstanding this, policy analysis could proceed by selecting the most preferred policy on the basis of the probabilities of the different outcomes of the policies. If society is averse to taking risks, it can be shown that uncertain costs should be given more weight than the expected value of costs and uncertain benefits should be given less weight than their expected value.

The alternative procedure is to select the mean estimates of the effects of different environmental policies. These estimates are then used to decide the most preferred policy. This procedure is the more commonly used. The choice of the best estimates is highly subjective. More important, this approach estimates only the expected effect and, in this sense, does not take account of either risk or uncertainty.

■ Economic Growth and the Environment

Figure 9.2 indicates that the environment is essential for economic activity and growth. It shows the importance of the effects of economic growth on the environment. Environmentalists have argued that unconstrained economic growth will lead to the exhaustion of non-renewable resources and to levels of environmental degradation that seriously affect economic production and the quality and existence of life (see Meadows *et al.* (1972) and Forrester (1971)). Economists believing in the effectiveness of the market have responded to these arguments (see Beckerman (1974) and Nordhaus and Samuelson (1977)).

If markets operate effectively, increased scarcity of non-renewable resources will increase their prices. These higher prices give incentives for changes in economic behaviour. Firstly, the direct consumption of these resources may fall – e.g. lower consumption of scarce fossil fuels. Secondly, the use of higher priced non-renewable resources in production will decline through substitution towards techniques of production that are less intensive in these inputs – e.g. production will become less fossil fuel intensive. Thirdly, there will be incentives to search for new supplies of these resources – e.g. the level of exploration for new oil fields will increase. Fourthly, higher prices will encourage the development of new technologies that provide substitutes for the scarce resources – e.g. non-fossil fuels such as 'bio-mass' or wind power – or utilise it more efficiently – e.g. fuel efficient cars. Thus, efficient markets may provide a solution to the running down of non-renewable resources.

Supporters of economic growth argue that its contribution to environmental pollution has been overestimated. They suggest that economic growth, particularly in developing countries, will release more resources that can then be used to reduce environmental degradation, e.g. improve water supplies and reduce urban congestion. This view of the existence of opportunities for simultaneous economic development and improvement in the environment is supported by the World Bank. However, the pursuit of these twin goals is usually assumed to require the state to intervene and improve the operation of markets with regard to the environment.

A different, perhaps intermediate, view of the relationship between the economy and the environment is of a trade-off between economic growth and environmental degradation. Thus, a society has to accept that higher levels of material standard of living will result in lower levels of environmental quality (see **Figure 9.1**).

All the different views of economic growth and environmental degradation considered here are likely to be true in part. It is unlikely that the debates on the relationships between the environment and the economy can be resolved through exhaustive scientific and economic investigation. Economic and environmental policies have to be formulated and carried out on the basis of existing uncertain and disputed evidence.

■ Sustainable Development

Much of the vast literature on the environment and the economy could be interpreted as a response to the concern that present patterns of economic growth may seriously degrade the environment and may be unsustainable, as the environment cannot support economic growth forever. This proposition may or may not be substantially true. At its heart lies the view that past and present economic policies have been usually concerned with providing the conditions for equilibrium economic growth as measured by standard national accounting methods. Many environmentalists are concerned that these policies have not attempted to ensure 'the existence of ecological conditions necessary to support human life at a specified level of well-being through future generations' (see Lele (1991)). This concern is of major importance in the concept of **sustainable development.**

There is a wide range of definitions and interpretations of the meaning of sustainable development. The term first came to prominence in the *World Conservation Strategy* presented in 1980 by the International Union for the Conservation of Nature and Natural Resources. It was popularised by the World Commission on the Environment and Development's study *Our Common Future* (1987), which is also known as the Brundtland Report, named in honour of its chairperson, the Norwegian Prime Minister. These and other studies have defined sustainable development in different ways. The most frequently quoted definition comes from the latter study:

> **Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.**

This definition would appear uncontroversial and is remarkably similar to the neoclassical definition of income. Hicks (1946) has given a frequently quoted definition of income:

> **A person's income is what he can consume during the week and still be as well off at the end of the week as he was at the beginning.**

However, the interpretation differs in that *Our Common Future* examined how sustainable development can be achieved. This inevitably requires the making of value judgements that link the positive definition and the operational objectives that it was suggested will result in the attainment of sustainable development. For this reason, there has been criticism of the connection between the definition and the operational objectives. The objectives are increasing economic growth, meeting basic needs, involving more of the population in development, controlling population growth, conserving and improving the environment, accounting for the environment in economic decision-making, changing technology, managing risk and changing international economic relationships.

The concept of sustainable development has gained very wide acceptance and has become a standard model for thinking about the environment, development and the economy. However, as suggested above, what the concept of sustainable development should imply for economic and environmental policies is disputed (see, for example, Redclift (1987)). In particular, the concern for equity between and within generations is central to most interpretations of the concept, but it is unclear how the welfare of individuals can be compared. This is a central problem in neoclassical economics and the concept of sustainable development does not appear to provide a solution to the problem.

■ Natural Capital and Equity

In many definitions, sustainable development can only be achieved if the environment is conserved and improved. This could be interpreted as keeping the stock of natural capital at least constant. This condition attaches greater importance to the stock of natural capital than to man-made and human capital. The neoclassical approach to analysis of the environment cannot be used to justify such a distinction between types of capital. It is important to consider possible justifications for this distinction and, in particular, with respect to the use of non-renewable resources.

The study of environmental values suggests three possible ways in which these values could be generated. First, the preferences of individuals give rise to values that with a complete set of perfect markets are reflected in the prices of goods and services. This is the neoclassical approach to valuation and examples of market failure have already been examined. Market failures suggest that the environment will not be adequately accounted for in the operation of market economies.

The second source of environmental values is that of social preferences. Sagoff (1988) has suggested that individuals are capable of considering issues, in particular those concerning the environment, from the point of society. It is not clear how such values could be established in the psyche of individuals. A possible explanation is a sociobiological one in that individuals behave as social organisms for the benefit of the species (see Dawkins (1976)). Environmental choices are so complex that even if social preferences exist it is difficult to assume that, apart from in a tautological sense, they will result in decisions that improve social welfare. However, it has been suggested that the poor in developing countries are the most dependent on the environment. Thus, if social preferences are to give weight to the circumstances of the poor, the environment should be given greater weight than would occur from simple aggregation of the individual values placed on the environment.

The third source of environmental values follows from the belief that ecological systems have intrinsic value independent of any value placed on them by humans (see Norton (1987)). The individual preferences basis for values considers only humans to have rights. The ecological view represents the extension of rights to other species. How these rights can be measured does not appear to have been addressed. The ecological values view suggests that greater weight should be attached to the environment than would be given by taking social values or simple aggregation of individual values.

Preserving or increasing the stock of natural capital has important effects on intergenerational equity. If it is believed that present levels of environmental degradation and resource use will substantially alter future human economic welfare, then intergenerational equity may be improved by the constraint that the stock of natural capital be preserved. However, the substitution of this constraint by a more flexible approach that allows some use of natural capital could conceivably increase economic welfare measured across all present and future generations.

The use of a positive discount rate weights future environmental effects less heavily than those occurring in the present. This has been criticised as underestimating the importance of environmental degradation and resource use. This criticism is misplaced. If the arguments are accepted for the social preference of the present compared to the future, then discounting is appropriate. If it is felt that too little weight is being attached to future environmental effects, their estimated values should be adjusted, but not the discount rate.

Many environmental effects are irreversible, e.g. the extinction of a species. Irreversibility has been used as an argument for maintaining the natural capital stock. However, the dislike of irreversible losses in natural capital can be captured by the concept of option, quasi-option and existence values.

The resilience of an ecosystem is its ability to return to its normal state after an external disturbance. It has been suggested that the larger the stock of natural capital, the more resilient an ecosystem is likely to be. This argument is justified on the basis of the idea that diversity of the ecosystem increases its resilience. However, the notion of resilience and the related concept of stability have been criticised, as no ecosystem is likely to be globally stable and constant through time. This implies that the size of the external disturbance is important (see Norton (1987)).

As discussed previously, uncertainty is crucial to the analysis of the relation between the environment and the economy. A possible policy response to such uncertainty is to adopt policies that provide insurance against possibly disastrous future outcomes. This risk-averse strategy of emphasising the worst possible outcome might be justified by, say, the worst forecasts of the disastrous outcomes of global warming. This argument supports the setting of a constraint that keeps the stock of natural capital fixed. Alternatively, it has been argued that the vast expenditure necessary to reduce global warming, the long period before such effects become important and the lack of absolutely clear scientific proof of the size of these effects suggest that a conservative approach ought to be adopted. It is unclear how uncertainty should be included in environmental decision-making, but it *is* clear that the treatment of uncertainty has a very important effect on the actual decisions that have been or will be taken.

The concept of sustainable development attaches a special importance to natural capital. This distinction between natural and man-made and human capital has been criticised. It is possible to substitute between the forms of capital and many environmental policies rely on this substitutability. For example, the use of fossil fuels can be reduced through energy conservation measures such as greater thermal insulation of buildings and thermostatically controlled heating systems. A possible justification of a special role for natural capital in development is the argument that past economic growth has resulted in the accumulation of man-made capital at the expense of natural capital. This use of natural capital occurred because it was undervalued by markets and the complex functions of the environment were not, or poorly, understood (see Pearce *et al.* (1990) and Ponting (1991)).

All these arguments suggest placing a higher value on the environment than the operation of a market economy would give. Strictly, this is not the same as suggesting that the stock of natural capital should be maintained. However, the complexity of decision-making on the environment might require a very approximate constraint on the use of environment such as preserving the stock of natural capital.

This critical discussion of the concept of sustainable development suggests that the environment has an important role in economic development and this may not have been fully understood in the past. The concept of sustainable development has won many academic and political adherents. However, there are differences in opinion whether natural capital deserves special protection in economic development or whether it can be traded off against man-made and human capital.[1] These differences are important in determining how the environment enters into economic decision-making.

There are also practical difficulties with the implementation of a constraint that keeps the stock of natural capital fixed. The environment is made up of many different resources and services. Constancy of the stock of natural capital could be interpreted as constancy of all types of natural capital. This interpretation implies that any positive use of non-renewable resources would not be compatible with sustainable development and is difficult to justify.

The alternative interpretation is to consider a single measure of natural capital that appropriately weights the different types of natural capital. The obvious weights are the social values of the types of natural capital. These values may not only reflect the ideas considered in equation (9.6) but the distributional views that are often associated with the idea of sustainable development. However, placing values on the different types of natural capital would appear to deny the special role of such capital. If natural capital can be valued so as to give a single measure, this implies that it can be traded off against man-made and human capital and requires no special protection in the process of development.

It may be the case that a single measure of most types of natural capital would be desirable with individual measures for the remaining and crucial types of natural capital, e.g. the ozone layer.

If the view is taken that the environment must be preserved, then social cost–benefit analysis of a project should be carried out subject to the additional constraint that the net effects on the environment are zero or positive. The strength of this additional constraint can be weakened by adding environmentally friendly investments to the project that allow the constraint to be met. If it is considered necessary to preserve the different types of natural stock, then there must be an additional constraint for each type of natural capital.

The constraint of preservation of all aspects of the environment implies that national income accounting methods cannot be altered to allow the calculation of one measure of economic welfare that includes environmental effects. Thus, it has been suggested that measures of economic welfare be presented alongside a set of indicators of the state of the environment.

The less restrictive interpretation of the concept of sustainable development allows the simple inclusion of the environment in social cost–benefit analysis and national income accounting. The inclusion of the environment simply requires the correct valuation of environmental effects.

Economic Thought and the Environment[2]

Classical economists such as Malthus, Ricardo and Mill were generally pessimistic about the possibility of continued economic progress.[3] These economists assumed that there was diminishing returns to factors of production and the supply of land was fixed. The growth in population and, thus, the labour force would lead to reductions in the marginal product of labour and declining average product of labour. Malthus and Ricardo assumed a constant technology, with the inevitable result that average agricultural production per unit of labour would decline. Mill considered that technical progress could offset the effect of diminishing returns to a factor, but was unlikely to do so in the long run.

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[1] For an example of the former view, see Pearce *et al.* (1990) and, for examples of the latter view, see World Bank (1992) and Winpenny (1991).

[2] See Barbier (1989) for a good survey of economic thought on the environment and development.

[3] See Malthus (1798), Ricardo (1817) and Mill (1856).

Marshall (1890) invented the idea of an externality and it was developed by Pigou (1920). However, generally environmental externalities were considered to be unimportant (see, for example, Little and Mirrlees (1968)).

The start of the debate about the environment and the economy is usually attributed to Rachel Carson in her 1962 book *Silent Spring* (1962). Other early contributions to the environmental debate were by Boulding (1966), the Ehrlichs (1968 and 1970), Goldsmith *et al.* (1972), Forrester (1971), Schumacher (1973) and Commoner (1972). A most influential environmental publication was *The Limits to Growth* by Meadows *et al.* (1972). The basic point of this study was that there are a number of non-renewable resources whose present levels of consumption will mean that the known reserves will be exhausted in the not so distant future. The study was heavily criticised for not allowing for the effects of the price mechanism to reduce consumption and provide incentives to explore for new reserves and to develop new technologies.

These environmental contributions to the debate stimulated economic interest in the relation between the environment and the economy. Barnett and Morse (1963) could find little evidence of resource scarcity in the American economy in the period 1850–1957. Dasgupta and Heal (1979) provided a rigorous neoclassical analysis of the depletion of exhaustible natural resources. Kneese, Ayres and D'Arge's (1970) development of the **materials balance approach** changed the view that some economists had of how the economic system dealt with the environment's waste absorption function. This simple principle states that the resources that flow into an economic system must eventually end up as waste products.

The debate about the environment and the economy has changed public views and, in particular, the views of international agencies have changed.

International Agencies and the Environment

In the last few years, international agencies have accepted the importance of allowing for the environment in economic development and have begun to change their practices. The International Monetary Fund has accepted that national income accounting procedures should allow for the environmental effects of economic activity (see Levin (1990)).

The General Agreement on Tariffs and Trade (GATT) Secretariat has attacked trade policies that degrade the environment.[1] For example: existing US and European Community protectionist agricultural policies are regarded as 'important sources of environmental degradation'; trade barriers that reduce the ability of developing countries to improve living standards are seen as frustrating their efforts to protect the environment; and GATT has suggested that countries with large forests should be paid for their 'carbon absorption services'.

The World Bank has accepted that the environment is directly relevant to the Bank's mission of supporting development (see Conable (1989) and World Bank (1992)). The World Bank supports the sustainable development view. There are various aspects to the Bank's new policy view. Firstly, it is accepted that there is a need for appropriate valuation of environmental effects. Secondly, poverty is seen as a major cause of environmental damage and the poor are regarded as being heavily dependent on the environment. Thirdly, it is argued that high-income countries must accept the financial responsibility and take the initiative for dealing with major worldwide environmental problems. However, it is also clear that the Bank disagrees with the view that economic development should take place under the constraint that the stock of natural capital should not be depleted. The International Development Association affiliate of the World Bank intends to increase its lending for environmental projects.

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[1] See 'Trade and the Environment', *Financial Times*, 12 February 1992.

The United Nations have been responsible for the two reports, *World Conservation Strategy* and *Our Common Future*, which have greatly influenced world opinion in favour of sustainable development. The United Nations' Development Programme and the World Bank set up the Global Environment Facility in 1990. The purpose of this fund is to subsidise projects in developing countries that protect the global environment. The fund focuses on four areas: global warming; destruction of the ozone layer; pollution of international waters; and reductions in biodiversity. The fund is financed by contributions from developed and developing countries to the extent of $3–4 billion.

The UN Conference on Environment and Development in June 1992 – the Earth Summit – reached agreements on various issues. A treaty to avoid global warming was signed by 110 countries (but not the United States), most of which agreed to limit atmospheric emissions in the year 2000 to their 1990 levels. An agreement to protect plants and animals was signed, but not by the United States. A convention to reduce desertification was agreed. Many other issues were discussed and Agenda 21 was written that lays down guidelines for environmentally sound development. The success of many of the agreements and guidelines depends on the availability of funding to finance appropriate development and monitoring of the development policies of individual governments.

The major omission from the treaties and guidelines at the Earth Summit was any commitment to increase aid, reduce debt and fundamentally shift resources from rich to poor countries. One of the underlying assumptions of the concept of sustainable development is that poverty is an important cause of environmental degradation. Lack of economic development in poor countries is likely to lead to more environmental degradation.

Questions for Discussion and Review

1. What are the functions of the environment in supporting economic activity?
2. What is an externality and why are externalities considered to be a problem?
3. What are the different possible solutions to externalities?
4. Explain the causes of 'the tragedy of the commons'.
5. Why might perfect capital markets not give a socially efficient allocation of resources between generations?
6. What conditions determine the efficient use of renewable and non-renewable resources?
7. What are the different types of values that should be included in social costs?
8. How might one adjust for environmental effects in social cost–benefit analysis and national income accounting practices?
9. Define and explain the idea of sustainable development.
10. What are the arguments for and against keeping the stock of natural capital fixed?

■ Chapter 10 ■

The Choice of Techniques

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The Capital Intensity of Techniques in Developing Countries

If labour is more abundant and capital is scarcer in developing countries than in developed countries, we might expect to observe the use of more labour-intensive techniques of production in the industrial sector of developing countries, reflecting a lower price of labour relative to capital. **Figure 10.1** shows this. Assuming the same production function in the two sets of countries, labelled '1', and holding everything else constant, the lower relative price of labour in the developing country, given by the price line (or isocost curve) *cb*, gives a more labour-intensive choice of technique than in the developed country, where the relative price of labour is given by the steeper line *ad*.

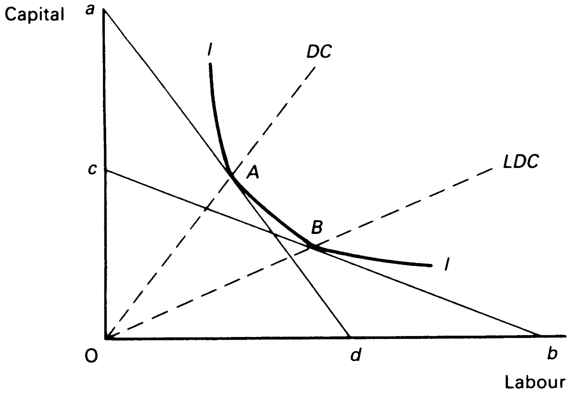
In the developed country, the capital–labour ratio is given by the ray from the origin, *DC*; while in the less-developed country, the capital–labour ratio is given by the ray, *LDC*; both rays passing through the point of tangency between the price line and production function – *A* and *B* respectively.

In practice, however, it is often the case that for the same outputs produced, the capital intensity of techniques is not very different between the two sets of countries, and that the capital–labour ratio differs between developed and less-developed countries in the aggregate only to the extent that the composition of output differs; that is, because developing countries have large sectors of their economy where very little capital is employed at all, as in subsistence farming and petty service activities. In the modern sector of developing countries, however, techniques are much more capital-intensive than would be predicted on the basis of knowledge of factor endowments. Given the supply of labour available, and given the rate of investment, the more capital-intensive the techniques, the less employment and the more unemployment.

Unemployment is one of the major preoccupations in developing countries, and one of the senses in which the techniques of production prevailing might be regarded as 'inappropriate'.

But what accounts for this relative capital intensity of modern sector techniques, and would the developing countries be better-off using more labour-intensive techniques? There are a number

Figure 10.1



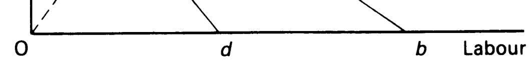
of reasons why technological choice sometimes appears to be little different in developing countries than in technologically advanced societies.

First, for a large number of commodities, there may not be a spectrum of techniques to choose from; that is, in practice, the production function in **Figure 10.1** may not be smooth, and a country cannot move from point *A* to *B* in accordance with differences in relative factor endowments and relative factor prices. We are talking here, of course, about techniques that are profitable. There may always be more labour-intensive techniques using both more labour *and* capital, but then output would not be saleable competitively. If there is not a spectrum of profitable techniques of production, and coefficients of production are fixed, the production function is L-shaped, and is sometimes called a Leontief production function after Wassily Leontief, the 'father' of input–output analysis (which assumes no substitutability between capital and labour – see Chapter 11). Whether world technology is such that there is only one profitable technique, or whether there is a spectrum of techniques but developing countries are denied access to them, is an empirical question that we shall consider later.

A second reason for the relative capital intensity of production in developing countries is that the market prices of factors of production frequently do not reflect relative abundance or scarcity. This tendency is often exacerbated by developing countries themselves which give generous subsidies to scarce capital and encourage high wages in the modern manufacturing sector by the government paying high wages to their own employees. The old justification for using capital-intensive techniques, which governments used to believe in and still do to a great extent, was that they were necessary to maximise output and saving, and that more labour-intensive techniques would reduce the level of output and saving because of their relative inefficiency and high wage bills. We shall examine these contentions thoroughly later in the chapter, but clearly the cheaper capital is made by subsidies and the higher wages are above their 'shadow' price, the more capital-intensive techniques will tend to be.

A third factor to bear in mind is that although labour may be abundant, and its money price may be lower than in developed countries, it is not necessarily 'cheaper' or less 'costly' to employ, because its productivity may be lower. In other words, the so-called *efficiency wage* (that is, the wage rate divided by the productivity of labour), or wage costs per unit of output, may differ very little between the developing and developed countries. This means that the production function for the developing country in **Figure 10.1** will lie outside the production function for the developed country in such a way that even if the relative money price of labour is lower in the developing country, it is profitable to choose a relatively capital intensive technique. **Figure 10.2** shows this. The production function for the developing country is labelled '2'. Even though labour is cheaper relative

Figure 10.2



to capital in the developing country (slope of $cb <$ slope of ad), nonetheless the most profitable capital–labour ratio will be the same in both countries (given by the ray from the origin, $DC = LDC$). It is probably because abundant labour is not necessarily 'cheap', in a cost per unit of output sense, that accounts for the observation that in trade developing countries' export goods are as capital intensive as in developed countries, contrary to the prediction of certain trade theories. This apparent paradox (sometimes called the Leontief Paradox) could be explained by the fact that it is the 'efficiency' wage that matters not the money wage, and while the money wage may be low in developing countries, the 'efficiency' wage is relatively high.

Fourthly, we may mention the fact that in certain instances capital intensity may be explained by a skill constraint. Typically, labour-intensive techniques require a great deal of skilled labour, compared to capital-intensive techniques which require a preponderance of semi-skilled labour to undertake routine tasks. In developing countries short of skilled manpower, capital may substitute for skills and constitute a rational response on the part of decision-makers, whoever they may be.

But perhaps the overriding factor which accounts for the relative capital intensity of the modern sector of developing countries is the fact that many, if not most, of the techniques of production are imported from abroad, with a heavy bias in the labour-saving direction. The techniques may either be employed by indigenous firms or, as increasingly seems to be the case, by large foreign owned **multinational corporations** who invest in the country and bring their technology with them. In this case, the technology may be 'inappropriate' not because there is not a spectrum of techniques, or an inappropriate selection is made, but because the technology available is circumscribed by the global profit maximising motives of the companies investing in the less developed country concerned. The labour-saving bias of the technology is to be explained by the labour-saving bias of technical progress in the advanced countries where labour is relatively scarce and expensive. As we saw in Chapter 4 (**Figure 4.2**) labour-saving bias on a production-function diagram is represented by a non-uniform inward shift in the production function causing capital to be substituted for labour at the same ratio of relative factor prices.

If developed countries have designed labour-saving technologies which through the process of international investment are now being widely used in developing countries, it might well be asked: why have developing countries not invented capital-saving technologies to economise on scarce capital? The answer is that if a country is to develop technology to save capital, it must have a capital goods industry, but typically the capital goods sector of developing countries is rudimentary or non-existent. With a large fraction of investment goods coming from abroad, and the relative unprofitability of production coupled with lack of know-how, there has been very little incentive for developing countries to establish capital goods industries. Capital goods production is characterised by the ability to specialise, but to do this economically requires a large market; a much larger market than for consumer goods producing homogeneous products which can reap economies of scale. Capital saving also comes from improvement in the efficiency of capital goods production itself, but without a capital goods sector there cannot be innovations and an important source of capital saving and technical progress in the economy as a whole is lost. It is widely recognised that a capital goods sector is essential for innovatory activity in the economy as a whole, and if developing countries are to reduce their dependence on imported technology from abroad, priority must be given to the establishment and nurture of an indigenous capital goods sector.[1]

The empirical evidence on multinational corporations and the choice of techniques is mixed. Lall (1978) distinguishes three separate issues. First whether technologies used by multinationals are adaptable to abundant labour and low wage conditions in developing countries; secondly whether multinationals do adapt the technologies they transfer, and thirdly whether multinationals adapt better or worse than local firms. On the first question, the technologies used by multinationals are unlikely to be very flexible because the companies tend to predominate in modern industries where processes are complex and continuous and, by their very nature, capital intensive. Outside processing, however, ancillary activities such as the handling of materials and packaging, may be amenable to substitution. On the second issue, it is unlikely that multinationals will undertake major, expensive alterations to technology simply to suit local conditions, and there is not much evidence that they do so. On the third matter, however, in comparison with local firms, the experience of the multinationals seems to be very mixed. The problem here is that in making comparisons, like must be compared with like; that is, local and foreign firms must be compared in the same market, producing similar products with equal access to technology. Studies must therefore be treated with caution. It is easy to reach the conclusion that multinationals are more capital intensive than local firms if they operate in different industries producing different products. This, in fact, is often the case; being concentrated in activities which are intrinsically more capital intensive such as heavy industries and extractive industries. We shall have more to say about the empirical evidence below and more to say about multinational corporations when we consider the role of private foreign investment in the development process in Chapter 14.

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[1] For a lucid discussion of these issues, see Stewart (1977), esp. ch. 6.

We turn now, however, to consider the potential conflict between moving towards the use of more labour-intensive techniques of production and output on the one hand and saving on the other.

The Conflict Between Employment and Output and Employment and Saving in the Choice of Techniques

Developing countries have three broad objectives: to raise the level of present consumption; to raise the level of future consumption (by saving now), and to raise the level of employment. In the choice of *new* techniques, a conflict between objectives may arise. First, a technique which maximises employment *may* involve a sacrifice of output. Secondly, a technique which maximises employment *may* involve a sacrifice of saving. As we have mentioned already, certainly one of the justifications for the use of modern capital-intensive technology used to be that labour-intensive techniques would reduce output and the investible surplus. We need to look at this matter theoretically and empirically. We shall argue that while in theory there may be a conflict, the assumptions on which a potential conflict is based are either invalid or too extreme, and that in practice developing countries could move towards the use of more labour-intensive techniques without sacrificing the level of present or future consumption. Some of the empirical evidence would seem to bear this out.

■ Employment *vs* Output

A potential conflict between employment and output exists in the choice of new techniques because methods which employ high labour–capital ratios may involve high capital–output ratios because labour productivity is lower.[1] We may use again the illustration given in Chapter 7 (p. 181). Assume a fixed amount of capital, £1000, to be invested. Technique I employs 100 men with an incremental capital–output ratio of 5 giving an annual flow of output of £200. Technique II employs 50 men with an incremental capital–output ratio of 4 giving an annual flow of output of £250. Therefore, the technique which maximises employment has a lower flow of current output.

It can be said straight away that there is very little evidence, if any, to support the view that labour-intensive techniques have higher capital–output ratios than capital-intensive techniques. On the contrary, there is growing evidence that

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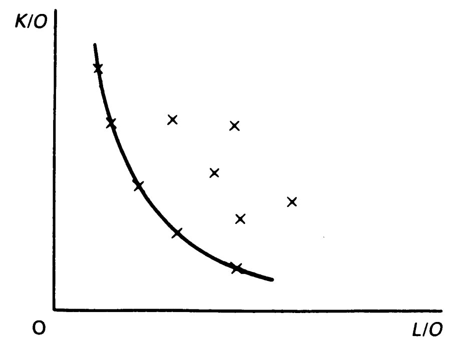
[1] The capital–output ratio (K/O) may be expressed as the product of the capital–labour ratio and labour requirements per unit of output i.e. $K/O = K/L \bullet L/O$. Techniques with a low K/L may nonetheless have a high K/O because L/O is high, i.e. the productivity of labour is low.

Figure 10.3



labour can be substituted for capital, provided co-operating factors are available, without the level of output being impaired. One interesting study is that by Pack (1974), using UN data on capital per unit of output (*K*/*O*) and labour per unit of output (*L*/*O*) for six commodities in sixteen firms across ten countries. Pack plots the observations of (*K*/*O*) and (*L*/*O*) (as in **Figure 10.3**) for each commodity from the cross-section data, and then defines the efficiency frontier to estimate the elasticity of substitution along it.

Each scatter point in **Figure 10.3** represents country observations for one industry, say cotton textiles, of the relative amounts of capital and labour employed per unit of output. The efficiency frontier (or unit isoquant) is drawn through the points closest to the origin and the elasticity of substitution is calculated as:

$$\frac{(K/L)_i}{(K/L)_j} = \left[\frac{(W/r)_i}{(W/r)_j}\right]^{\sigma}$$

where W/r is the wage-rental ratio, i and j are the two observations closest to the origin, and σ is the elasticity of substitution. For five of the six commodities there is a large difference in the amount of capital per man year used by countries on the efficiency frontier and a fairly high elasticity of substitution. The results are shown in **Table 10.1.** The results suggest that for countries using large amounts of capital per unit of labour there are more labour-intensive techniques available (as used by other countries) that could be adopted without sacrificing output unless the co-operating factors associated with the increased labour intensity are not available. One interesting observation from Pack's work is that India is invariably either on, or close to, the efficiency frontier using labour-intensive techniques effectively.

Pack's study (1976) of 42 plants in Kenyan manufacturing also suggests that there appears to be considerable *ex ante* choice of capital intensity in most industries, particularly outside the processing sector in the auxiliary activities of material

Table 10.1 *Capital–Labour Substitution Possibilities*

Industry	*Countries on the efficiency frontier*	*Capital per man year ($)*	*Elasticity of substitution (σ)*
Bicycles	India Japan	400 520	0.24
Grain milling	Japan Israel	280 6 410	3.7
Paints	India Middle Europe	214 2 790	1.6
Tyres	Iran Mexico	6 240 10 600	1.5
Cotton textiles	India Mexico	1 100 8 240	2.0
Woolen textiles	India Japan	260 4 600	1.2

Table 10.2 ***Fixed Investment and Employment Associated with Capital-Intensive and Appropriate Technologies***

		Capital-intensive technology			*Appropriate technology*		
Sector	*Annual output of plant*	*Investment in thousands of dollars*	*Number of workers*	*Thousands of dollars per worker*	*Investment in thousands of dollars*	*Number of workers*	*Thousands of dollars per worker*
Shoes	300 000 pairs	334	155	2.2	165	218	0.8
Cotton weaving	40 000 000 square yards	9 779	260	37.6	4 715	544	8.7
Cotton spinning	2 000 tons	1 440	98	14.7	480	240	2.0
Brickmaking	16 000 000 bricks	3 437	75	45.8	796	238	3.3
Maize milling	36 000 tons	613	63	9.7	219	96	2.9
Sugar processing	50 000 tons	6 386	1 030	6.2	3 882	4 986	0.8
Beer brewing	200 000 hectolitres	4 512	246	18.3	2 809	233	12.1
Leather processing	600 000 hides	6 692	185	36.2	4 832	311	15.5
Fertilizer	528 000 tons of urea	34 132	248	137.6	29 597	242	122.3

receiving, material handling among processes, packaging and storage of the finished products. In fact, many auxiliary activities are already very labour-intensive, and contrary to the conventional wisdom it was found that foreign-owned firms generally used more labour-intensive techniques than indigenous firms. Pack ascribes this to the better managerial expertise and technical training of personnel in foreign firms. Forsyth and Solomon (1977) in their study of Ghana also find scope for capital–labour substitution and find no overwhelming evidence that foreign firms are more capital intensive than resident expatriate or private indigenous firms. The situation varies from industry to industry. Helleiner (1975) concludes his survey of multinational corporations and technological choice by saying: 'In particular industrial sectors, the multinational firm has often proven more responsive and adaptable in its factor and input use, especially in the ancillary activities associated with the basic production processes, than local firms, and so it perhaps should be with its wide range of experience on which to draw.'

Aggregative Implications of Factor Substitution

Pack has taken nine industrial sectors from the studies of others which have examined the choice of techniques and has worked out the aggregative effects on employment, wage income, non-wage income and value-added of $100 million investment in each sector, using the most capital-intensive technique, and the most appropriate technology defined as that which yields the highest present discounted value per unit of capital (Pack (1982)). The results are very revealing, although Pack pinpoints many obstacles to the adoption of more labour intensive technology. The industrial sectors taken are shown **Table 10.2**, which gives data on investment and employment in relation to output for the two technologies compared. For most sectors there are wide differences in the capital–output ratio and the capital–labour ratio.

To derive the aggregative implications of factor substitution each sector is assumed to have invested $100 million, either on the most capital intensive process, or on the most appropriate technology, from which employment, wage income (assuming an annual average wage of $500 per worker), non-labour income and value-added can be calculated for the two technologies. The results are shown in **Table 10.3**.

Focusing on the aggregate totals, it can be seen that value-added on the appropriate technology is nearly twice as high as on the most capital intensive technology, and that the aggregate level of employment is four times higher. Note also that while labour's share of value-added is higher on

Table 10.3 ***Annual Employment, Wage and Non-Labour Income, and Value-Added Under Alternative Technologies***

Sector	*Employment*[a]		*Wage income*[b]		*Non-labour income*[b]		*Value-added*[b]	
	Appro-priate	*Capital intensive*	*Appro-priate*	*Capital intensive*	*Appro-priate*	*Capital intensive*	*Appro-priate*	*Capital intensive*
Shoes	31 589	18 158	15.79	9.08	73.19	59.04	88.99	68.12
Cotton weaving	10 488	2 538	5.24	1.27	18.20	3.61	23.44	4.80
Cotton spinning	10 747	4 525	5.37	2.26	52.61	32.00	57.98	34.26
Brickmaking	29 909	2 182	14.95	1.09	40.72	–5.50	55.67	–4.41
Maize milling	19 231	7 574	9.62	3.79	13.48	8.30	23.10	12.09
Sugar processing	123 980	15 925	61.99	7.96	185.68	154.84	247.66	162.80
Beer brewing	7 460	4 316	3.73	2.16	48.66	21.73	52.39	23.89
Leather processing	4 502	2 108	2.25	1.05	17.49	10.72	19.74	11.77
Fertilizer	772	691	0.39	0.35	54.57	49.76	54.95	50.11
Total	238 678	58 017	119.33	29.01	504.60	334.50	623.92	363.51

[a] All workers in the industry.

[b] Millions of dollars.

the more labour intensive technology, and the share of profits is lower, the absolute level of non-labour income is higher. There is no clash between employment and output, or employment and the reinvestible surplus. However, value-added per worker on the more labour-intensive techniques is less than half the level on the most capital-intensive techniques. What is also clear from the table is that there are large differences between sectors in the capital–labour ratio using more appropriate technology, so that the actual sectoral composition of investment will affect the aggregate calculations of employment effects. To increase employment, therefore, it is possible to exploit the scope for factor substitution between sectors as well as within sectors. The obstacles identified by Pack to the adoption of more labour-intensive technology include: the costs of information; the problems associated with the use of second-hand machinery; the fact that technical change may be slowed down, and the shortages of skilled manpower. Pack shows high benefit–cost ratios to training in skills, and to overcome the problems arising from the adoption of more labour-intensive technologies he suggests an industrial extension service equivalent to the extension services commonly available for the agricultural sector in developing countries.

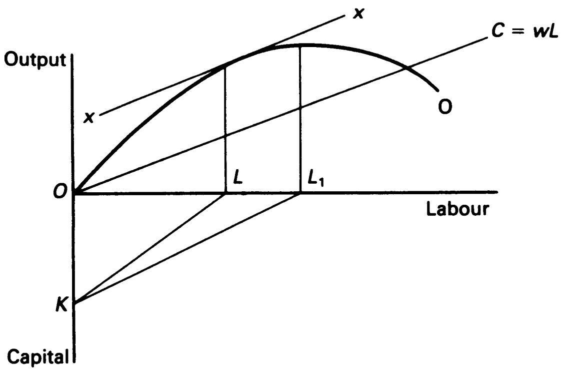
Even if more labour-intensive techniques can be used without a sacrifice of output, there is still the question of whether the investible surplus, and therefore future output, will be impaired. The work of Pack suggests otherwise, but let us turn to consider in more detail the potential conflict between employment and saving, as the traditional argument has it.

■ Employment *vs* Saving

The potential conflict between employment and saving can be illustrated in its starkest form using a simple production function diagram first used in this context by Dobb (1955) and Sen (1968).

Consider the use of a given amount of investible resources *OK* and the possibility of employing those resources with varying amounts of labour to produce output. *OO* is the production function in the consumption sector exhibiting diminishing returns to labour. Now take the standard traditional (though not necessarily correct!) assumption that in the industrial sector labour is paid a fixed wage which is all consumed so that a ray from the origin (*OC*) with a constant slope (*w*) shows the level of the wage bill and consumption at each level of employment. The difference between *OO* and *OC*

Figure 10.4



is profit; and if all profits are saved the difference also shows the level of saving at each capital–labour ratio. Saving is maximised where a line drawn parallel to OC is tangential to the production function – at employment level OL in **Figure 10.4.** Beyond this point further employment generation would diminish the level of saving and investible surplus. If the production function in **Figure 10.4** is denoted algebraically as:

$$0 = aL - bL^2 \tag{10.1}$$

and the savings function as:

$$S = aL - bL^2 - wL \tag{10.2}$$

the level of employment which maximises saving is obtained by differentiating equation (10.2) with respect to L and setting equal to zero which gives:

$$\frac{\partial S}{\partial L} = a - 2bL - w = 0 \tag{10.3}$$

Therefore the level of employment which maximises saving is:

$$L = \frac{a - w}{2b} \tag{10.4}$$

and the level of employment which maximises output is:

$$L_1 = \frac{a}{2b} \tag{10.5}$$

Since $L < L_1$, there is a conflict between savings and employment maximisation. The more labour-intensive technique maximises output and consumption in the short run; but the more capital-intensive technique provides a greater surplus for reinvestment for growth and future output and consumption. As Dobb puts it:

> The choice between more or less capital-intensive forms of investment has nothing to do with existing factor proportions. It depends, not on the existing ratio of available labour to capital (treated as a stock), but on precisely the same considerations as those which determine the choice between a high and a low rate of investment – namely the importance to be attached to raising consumption in the immediate future compared with the potential increase of consumption in the more distant future which a particular rate of investment or form of investment will make possible. In other words, the same grounds which would justify a high rate of investment . . . would justify also a high degree of capital intensity in the choice of investment forms, and vice versa! (Dobb (1955)).

The potential clash between increasing employment and maximising saving, represented by the difference between L_1 and L in **Figure 10.4,** can be seen, however, to be based on several assumptions, the validity of which may be questioned. These assumptions are: (i) That the wage rate is given and invariant with respect to the technique of production. This assumption would seem to be a hangover from Lewis's influential model of the development process (discussed in Chapter 3) which assumes an elastic supply of labour to the industrial sector at a *constant* wage. If this wage is above the minimum necessary, however, several implications follow. (ii) That all profits are saved and all wages are consumed. (iii) That employment which results from the use of capital-intensive techniques does not reduce community saving to the level of saving that would prevail with more employment and a higher wage bill. (iv) That consumption is not productive (i.e. has no investment component), or that present consumption is no more productive than future consumption. (v) That governments lack the ability to tax and to subsidise labour to reconcile the potential conflict.

Let us relax these assumptions and see what difference is made.

Wages and the Capital Intensity of Production

Let us first relax the assumption that the wage rate is given and the same for all techniques, regardless of the capital intensity. There are two fundamental points to be made here in the context of a developing country. The first is that a great deal of the technology, at least in the modern industrial sector, is not indigenous but imported from abroad. In this case the wage structure is set by the skill mix demanded by the technology and the need to keep the labour force well nourished and contented if the capital equipment is to be worked productively and profitably. By and large it may be expected that the greater the degree of capital intensity the higher the average wage paid. The second point is that with large amounts of disguised and open unemployment in the urban sector of developing countries there is likely to be a big difference between the wage that is being paid with the use of existing technology (imported or indigenous) and the wage at which labour would be willing to work given the opportunity with the use of more labour-intensive technology. If more labour-intensive technology could be developed and applied there is no reason why the wage rate should not be lower with the use of these techniques unless there is strong trade union resistance in certain sectors.

If the wage is not assumed to be given but may vary with the technique of production for the reasons outlined above, the conclusion of a conflict between employment and saving in the choice of new techniques is affected considerably. Indeed on the assumption that the marginal product of labour declines with the labour intensity of production, and that the wage is equal to the marginal product, the conflict disappears entirely. The surplus increases the greater the volume of employment.

This is obvious since under these conditions the surplus on *intramarginal* units of labour increases. The formal proof is as follows. From the production function in equation (10.1) the marginal product of labour is $(a - 2bL)$. Setting the wage equal to the marginal product and substituting for w in the savings function in equation (10.2) gives:

$$S = aL - bL^2 - (a - 2bL)L \qquad (10.6)$$

Partially differentiating equation (10.6) with respect to L gives:

$$\frac{\partial S}{\partial L} = 2bL > 0 \qquad (10.7)$$

Thus there is no conflict between saving and employment at positive levels of employment if the wage rate equals the marginal product of labour, both of which fall with the labour intensity of production.

We need not assume that the wage is equal to the marginal product of labour. We can simply assume that the wage falls with the labour intensity of techniques, i.e. $w = f(L)$, where $f' < 0$. Now rewrite the savings function as:

$$S = aL - bL^2 - f(L)L \qquad (10.8)$$

differentiate with respect to L, and set equal to zero:

$$\frac{\partial S}{\partial L} = a - 2bL - [f'(L)L + f(L)] = 0 \qquad (10.9)$$

The employment level which maximises saving is now:

$$L^* = \frac{a - f(L)}{2b + f'(L)} \qquad (10.10)$$

Since $f'(L) < 0$, $L^* > L$, and the conflict between employment generation and savings maximisation is narrowed. (Compare equation (10.4) with (10.10).)

Presumably wages cannot fall to zero, however; there must be some minimum below which wages cannot fall. This gives the conclusion that there is no necessary conflict between employment and saving up to the point where the marginal product equals the minimum wage or where $f'(L) = 0$. Beyond that point there will be a conflict. Let us denote the minimum wage as $\bar{w}$. Then, using equation (10.2) or (10.8) we can find the level of employment at which a conflict sets in by differentiating with respect to L and setting the result equal to zero. This gives:

$$L^{**} = \frac{a - \bar{w}}{2b} \qquad (10.11)$$

L^{**} is obviously less than L_1 in **Figure 10.4**, where w is assumed to be zero, but will probably be much greater than L if the market wage is considerably in excess of the minimum wage at which workers would be willing to work given the opportunity.

On the empirical question of wages in relation to techniques, there is considerable evidence that wages are related to labour productivity and the type of technique such that wages per man are higher the more capital intensive the technique. The evidence comes from a variety of sources. In a study of ten industries in India, Sandesara (1966) found that wages per worker are lower the more labour intensive the technology. He also found that labour-intensive technology had higher output and a higher surplus per unit capital, implying no conflict either between employment and output, or between employment and saving. It should be stressed, however, that these favourable features of labour-intensive technology were found predominantly in large plants. The performance of small plants was generally bad. In a similar study of four industries in Pakistan, Ranis (1962) found that profits relative to the capital stock seemed to be maximised in medium-sized plants rather than in the largest and most capital-intensive enterprises. Further evidence can be found in a paper by Stewart and Streeten (1971).

The Propensity to Consume of Different Classes

The alleged conflict between employment and saving also depends on the assumption that the propensity to save out of profits is higher than the propensity to save out of wages. In **Figure 10.4** the difference between employment levels OL and OL_1 depends on the extreme assumption that all profits are saved and that all wages are spent. No one would dispute that the propensity to save out of profits is higher than the propensity to save out of wages (indeed there is plenty of empirical evidence to support the assertion) (see Thirlwall (1974)), but it is somewhat extreme to argue that there is no saving out of wages and no consumption out of profits. Both consumption out of profits and saving out of wages will reduce the conflict between employment and saving and move the point of maximum surplus away from OL towards OL_1. To show this, we rewrite the savings function as:

$$S = s_p(aL - bL^2 - wL) + s_w(wL) \qquad (10.12)$$

where s_p is the propensity to save out of profits, and s_w is the propensity to save out of wages. Partially differentiating equation (10.12) with respect to L and setting equal to zero gives the level of employment consistent with savings maximisation of:

$$L^{***} = \frac{s_p a + w(s_w - s_p)}{s_p 2b} \qquad (10.13)$$

If $1 > s_p > s_w > 0$ it can be seen that L^{***} represents a higher level of employment than L in equation (10.4) or L^{**} in equation (10.11) if w is replaced by $\bar{w}$. The narrower the difference between s_w and s_p the higher the level of employment before a conflict sets in, until in the limit if $s_w = s_p$ there is no conflict as long as the marginal product of labour is non-negative. The level of employment at which a conflict sets in will be the same, in other words, as if the wage rate were zero – L_1 in **Figure (10.4)** and equation (10.5):

$$L^{***} = L_1 = \frac{a}{2b}$$

Bhalla (1974) has shown how the assumption that workers save alters the marginal calculation of the reinvestible surplus per unit of capital between techniques in his interesting case study of three cotton spinning techniques in India – two hand spinning techniques and one (relatively capital intensive) factory spinning technique. Assuming workers do not save Bhalla finds that the most labour-intensive hand spinning technique has the lowest *K/O* ratio but that the factory spinning technique has the highest reinvestment ratio. On the assumption that hand spinners do save, however, the most labour-intensive techniques are also shown to have the highest rate of reinvestment per unit of capital.

■ Support of the Unemployed

If a particular choice of technology, which is designed to maximise the reinvestible surplus, causes unemployment, and the unemployed make claims on society's investible resources, the surplus may ultimately be less than if more labour-intensive techniques had been chosen. There are three main ways in which the unemployed may reduce the investible surplus. If the unemployed remain in the agricultural sector they may depress average product and consume more than they produce reducing the agricultural surplus. If the unemployed remain in the industrial sector they will absorb family saving in supporting themselves. Thirdly, there may be public support for the unemployed through unemployment insurance programmes in which case public saving will be reduced below what it otherwise might be. If 'compensation' to the unemployed in any of the forms outlined above exceeds the difference between the industrial wage and the marginal product using more labour-intensive techniques, it would pay to create extra employment because the difference between consumption and production as a result of expanding employment would be less than the reduction in saving caused by the unemployment. In the limit, of course, if the unemployed 'consumed' resources equal to the value of the industrial wage, it would make no difference if labour was employed up to the point where the marginal product of labour is zero. There is clearly no difference from the point of view of saving between an unemployed man consuming the equivalent of an industrial wage and an employed man with zero marginal product receiving an industrial wage. As long as unemployment absorbs saving, therefore, in whatever form, employment can be higher without reducing the investible surplus below what it would otherwise be. Thus as a general proposition it can be said that the extent of the conflict between employment and saving will also depend on the amount of compensation to the unemployed out of the total investible surplus.

■ Are Consumption and Investment Distinct?

The alleged conflict between employment and saving also assumes either that consumption has no investment component or that present and future consumption are equally productive. Those who argue for techniques to maximise the investible surplus at the expense of employment place no value on present consumption at the margin, and those who argue for techniques to maximise employment are indifferent at the margin between an extra unit of consumption and saving (investment). It can be shown, however, that if consumption has an investment content, and that the productivity of consumption falls as the level of consumption increases, the relative valuation of present consumption increases favouring more labour-intensive techniques (Thirlwall (1977)). By 'productive' consumption we mean consumption which improves the efficiency of labour thereby raising the level of income in the same way as normal additions to the capital stock. As long as consumption is productive, therefore, an increase in employment and consumption need not be at the expense of 'investment' for future output.

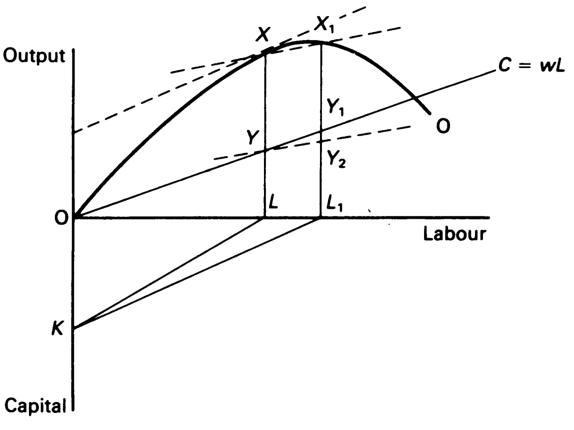
All too little is known about the precise extent to which low levels of consumption, and particularly food intake, impair working efficiency and productivity (see Bliss and Stern (1978)). But we do know that the food requirements considered by nutritionists to be necessary for efficient working and healthy living are far greater than the levels achieved by a large minority of the population in developing countries. Calorie deficiency causes loss of body weight, tiredness, listlessness and a deterioration of mental faculties. Protein deficiency causes such conditions as kwashiorkor, and may cause death in children. Vitamin A deficiency causes blindness, and iodate deficiency is a cause of goitre, which leads to cretinism and deaf-mutism. Altogether it has been estimated by the UN Food and Agriculture Organisation that there are at least one billion people in the world suffering from various degrees of malnutrition. To the extent that this impairs efficiency and output, and is caused by a lack of consumption, an increase in present consumption may be as valuable at the margin as an extra unit of saving from the point of view of future welfare. The more equal the relative valuation of consumption and saving at the margin the less the conflict between employment generation in the present and the level of future output.

■ Taxes and Subsidies

It has been assumed so far that savings and employment depend exclusively on the choice of technique. In practice, of course, governments can tax and subsidise to achieve desired ends, and this they can do to reconcile the conflict between employment and saving. As Sen (1969) has remarked 'the total amount of income to be saved can be determined by the planner in any way he likes. . . . If this is true then the link snaps between the choice of techniques and the proportion of income saved. The technical choice may be made with the main purpose of maximising the amount of output, and the proportion of the output to be invested can be decided at a separate stage.'

Consider again **Figure 10.4**, which is redrawn as **Figure 10.5**. By the choice of techniques alone, maximisation of the surplus XY means a sacrifice of employment L_1L. Or employment, OL_1, means a sacrifice of savings equal to Y_1Y_2. Now suppose that the government possesses the power to tax and subsidise. To employ OL_1 requires a shadow wage of zero: that is, a subsidy to employers equal to the full value of the wage. The employers' surplus will now be X_1L_1, but since workers receive the market wage and all wages are consumed, consumption will still be, Y_1L_1, and the investible surplus, X_1Y_1. The question is can tax policy in the new situation preserve the level of the surplus XY generated by the more capital intensive technology? The answer must be yes, provided the propensity to consume is greater than zero. The total wage bill is Y_1L_1 and it is desired to reduce consumption out of the wage bill by Y_1Y_2. Consumption will fall by the amount of tax times the propensity to consume (c). Hence the level of tax raised must be $T = (Y_1Y_2)/c$. If the wage bill is, say, £1000, Y_1Y_2 is £100, and c is 0.8, then the tax raised must be £100/0.8 = £125. In this example the preservation of the level of saving is quite easily accomplished while moving from the more capital-intensive to labour-intensive techniques. If, of course, a fairly high level of taxation already existed, and there was no scope for further taxation, subsidisation and taxation would not be a feasible means of reconciliation. In practice, however, the presumption must be that developing countries are not yet at their taxable capacity, and that the subsidisation of labour, coupled with appropriate tax policy, is a possible policy.

Figure 10.5



Some care must be taken, however, over the form of taxation. For example, if the wage is fixed in real terms, indirect taxes which raise prices will reduce the real wage, and the money wage will have to rise to compensate. Since the money wage is the cost to the employer, subsidies would then have to be increased. The imposition of indirect taxes to finance subsidies may lead to a spiral of increased taxation, inflation and subsidisation. Direct taxes on workers' incomes may also be counterproductive if workers bid for money-wage increases to maintain disposable income. The only feasible taxes to finance subsidies may be on exports or luxury consumption goods which do not affect the real income of the broad mass of the working class. While theoretically, therefore, a policy of labour subsidisation financed by taxation may reconcile the conflict between employment and saving, it may run into a number of practical difficulties.

All of the factors discussed that may lead to an increase in the labour intensity of production without impairing the investible surplus may either be thought of as additive, or any one of them by itself may be powerful enough to push employment close to L_1 in **Figure 10.4** without loss of saving or its benefits.

■ Conclusion

It has become part of the conventional wisdom, and there may be a good deal of truth in the assertion, that a major cause of the growth of urban unemployment in developing countries lies in the application of 'inappropriate' techniques of production because of the limited choice of techniques available both from within the countries and from outside. The choice is limited from within owing to the absence of a domestic capital goods sector, and it is limited from without because the techniques imported reflect the labour-saving bias of technical progress in the developed countries from which they come. The application of 'inappropriate' technology not only exacerbates unemployment, but perpetuates the dualistic structure of developing countries; increases income inequality, may worsen the foreign exchange position, and in general produces a distorted economy, increasing the dependence of developing countries on developed countries at the same time.

There is now a strong movement throughout the developing countries which supports the creation of an **intermediate technology** using more labour per unit of capital and less foreign inputs. What is required is a whole spectrum of techniques to suit different circumstances, from which developing countries can choose. For this to transpire, developing countries need to encourage the establishment of their own capital goods industries; and more research and development is required both within, and on behalf of, poor countries. An **international technology bank** would be a useful starting point giving countries access to technological blue-prints from different sources.

The capital intensity of production is also a function of the composition of output. There are often many ways of meeting a given need, some of which may be more labour intensive than others. Where this is so, such as in the fields of transport, nutrition, housing, etc., serious consideration should be given to the most labour-intensive way of meeting such needs, consistent with other objectives.

Finally, the location of activity needs considering. Whatever technology is applied in the modern sector, it will have implications for the rural sector which will rebound on the modern sector. We saw in Chapter 3 that the creation of more modern sector jobs may encourage more migrants than the number of jobs created, thus increasing urban unemployment. This would seem to call for the location of new labour intensive industries in the rural sector, to curb the flow of migrants and to ease urban unemployment.

To conclude our analysis we have seen that there are many reasons for believing that the potential conflicts inherent in the choice of new techniques between employment and saving on the one hand, and between employment and output on the other, have been exaggerated, and that techniques can be more labour intensive without impairing the level of the investible surplus or the level of output. It is in the direction of more rural-based labour-intensive projects that development strategy ought to move for maximisation of the general welfare.

Questions for Discussion and Review

1. What are the major factors which dictate the choice of techniques in the industrial sector of developing countries?
2. Why did early development theory tend to stress the importance of capital-intensive techniques for rapid economic development?
3. Would the use of more labour-intensive techniques necessarily reduce the size of the investible surplus?
4. Outline the importance for developing countries of promoting their own indigenous capital-goods sector.
5. To what extent are multinational corporations responsible for the relatively high degree of capital intensity of production in the manufacturing sector of developing countries?
6. Outline how a change in the product mix could help to create more employment?
7. Would the use of more labour-intensive technology in the industrial sector in urban areas necessarily reduce the level of urban unemployment?
8. What do you understand by the 'efficiency wage' of labour, and how does this concept help to explain the relative capital intensity of production and goods traded?
9. How can governments help to reconcile the potential conflict between increasing employment by the use of more labour-intensive techniques and raising the level of saving for investment?
10. What would be the best way of encouraging the use of more labour-intensive techniques in developing countries?

■ *Chapter 11* ■

Input–Output Analysis

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Input–output analysis is a particular planning and forecasting technique with a wide variety of applications. The purpose here is to present the basic elements of the technique, without going into its refinements, and to illustrate some of its uses.

An input–output table provides a descriptive set of social accounts, recording purchases by, and sales from, the different sectors of the economy distinguished. It provides a snapshot picture at a point in time of the interdependencies between activities in an economy. Tables may be constructed for a whole economy, for a region within an economy, or to show flows between regions. They may vary in size and ambitiousness according to the number of sectors identified and the purposes for which they are constructed. The most common type of input–output table at the national and regional level is that recording inter-industry transactions showing, in Hirschman's terms, the backward and forward linkages in an economy.

The Uses of Input–Output Analysis

Input–output analysis has many uses:

1 Input–output analysis may be used for **projection and forecasting** purposes. After some manipulation (which we shall consider shortly), an inter-industry transactions matrix can provide information to the planner on how much of commodities X_1, X_2, X_3, etc. will be required at some future date assuming a certain growth rate of national income or final demand. Information of this nature is important if planning is to achieve consistency and if future bottlenecks in the productive process are to be avoided.

2 Input–output analysis can be used for **simulation** purposes. The simulation of development is concerned with what is economically feas-

ible, as opposed to forecasting, which is concerned with what one expects to happen on the basis of a certain set of assumptions. In the case of simulation there is no presumption that the simulated changes in the economy are actually going to occur. If they are economically feasible the changes could occur, but whether they do or do not may depend on a variety of prior changes of an economic or institutional nature which may be outside the planner's control. Using an input–output table for simulation purposes requires first that the feasible changes (e.g. new activities such as import substitutes) be identified, and then that the table be used to estimate the impact of the changes on the rest of the economy. Again, with some manipulation, the inter-industry transactions matrix can then be used for providing answers to such questions as: how will the production requirements of the economy be altered if a new steel mill is introduced; or what will be the repercussions on the economy if a series of import-saving schemes are introduced?

3. To **forecast import requirements** and the balance-of-payments effects of given changes in final demand.
4. To **forecast labour requirements** consistent with a given growth target.
5. To **forecast investment requirements** consistent with a given growth target if information is available on incremental capital–output ratios sector by sector.
6. To calculate the **matrix multiplier** attached to different activities; that is, the direct and indirect effects on the total output of *all* activities in the system from a unit change in the demand for the output of any *one* activity.
7. To show the strength of **linkages** between activities in an economy.
8. To portray the **technology** of an economy.

Three major stages must be gone through before knowledge of input–output relations can be put to practical uses in the planning field in the manner described above. The first step must be the **construction of the input–output table** itself recording the relevant transactions. The second stage involves the derivation of what are called **input–output coefficients** (or input coefficients, for short). The third task is the inversion of the so-called **Leontief matrix** to obtain a *general solution*. The content of these stages, and the underlying assumptions of input–output analysis, will become clear as we examine the three stages in turn. We shall wait until the end, however, to spell out the assumptions explicitly, and to discuss the shortcomings of input–output analysis for planning purposes.

■ The Input–Output Table

The layout of a typical input–output table, and the sectors and transactions distinguished, is shown in **Table 11.1**. The table is divided horizontally into a **processing** and **payments** sector, and vertically to distinguish between **intermediate users** of goods and factors of production, and **final users**. Thus the upper left-hand quadrant of the table records inter-industry transactions; the lower left-hand quadrant gives the payments by industries to the factors of production and to foreigners for the purchase of imports; the upper right-hand quadrant gives the final demand for goods and services produced (including exports), and the lower right-hand quadrant gives the direct sales of factors of production and imports to final users, e.g. the private consumption sector buys domestic help, and the government sector 'consumes' civil servants!

The notation used in the table to denote the various transactions should be easy to follow. Take first the processing sector. The Xs stand for the value of output, and the two subscripts denote the origin of the output and its destination, respectively. Generalising, X_{ij} denotes sales by industry i to industry j or inputs into industry j from industry i, where $i = 1, \ldots, n$, and $j = 1, \ldots, n$. The disposal of outputs to final users can be represented in exactly the same way.

In the payments sector, the subscript simply refers

Table 11.1 ***Input–Output Table***

		Purchases by	Intermediate users					Final demand				
			Industries					Consumption		Investment (I)	Exports (E)	Total demand
Sales by								Private (C)	Government (G)			
			1	2	3	j	n					
PROCESSING		1	X_{11}	X_{12}	X_{13}	X_{1j}	X_{1n}	X_{1C}	X_{1G}	X_{1I}	X_{1E}	X_1
		2	X_{21}	X_{22}	X_{23}	X_{2j}	X_{2n}	X_{2C}	X_{2G}	X_{2I}	X_{2E}	X_2
	Industries	3	X_{31}	X_{32}	X_{33}	X_{3j}	X_{3n}	X_{3C}	X_{3G}	X_{3I}	X_{3E}	X_3
		i	X_{i1}	X_{i2}	X_{i3}	X_{ij}	X_{in}	X_{iC}	X_{iG}	X_{iI}	X_{iE}	X_i
		n	X_{n1}	X_{n2}	X_{n3}	X_{nj}	X_{nn}	X_{nC}	X_{nG}	X_{nI}	X_{nE}	X_n
PAYMENTS	Wages		W_1	W_2	W_3	W_j	W_n	W_C	W_G			W
	Rent		R_1	R_2	R_3	R_j	R_n	R_C	R_G			R
	Interest		D_1	D_2	D_3	D_j	D_n	D_C	D_G			D
	Profits		P_1	P_2	P_3	P_j	P_n	P_C	P_G			P
	Imports		M_1	M_2	M_3	M_j	M_n	M_C	M_G	M_I	M_E	M
	Total supply		X_1	X_2	X_3	X_j	X_n	C	G	I	E	

to the industry or final demand sector making the factor payment, and the same for imports.

We see, then, that in the processing half of the table each row shows how the output of each industry is disposed of, and each column shows the origins of inputs into each sector. The sum of each row gives the total demand for each industry's output.

In the payments half of the table, the sum of each row gives the value of the various factor payments, and the sum of each column in the bottom left-hand quadrant gives the total value-added (in the form of factor payments) to the inputs bought by the different industries.

In the intermediate sector, the sum of the columns gives the value of the total output of each industry, i.e. the sum of the value of inputs in the processing half plus the sum of value-added in the payments half plus imported inputs. Thus the columns in the intermediate sector and the rows in the processing sector both add up to the total value of domestic production. Let us demonstrate this proposition using the notation of our table. Call industry (1) the coal industry. The (domestic) output of coal must equal all its intermediate uses $X_{11}, \ldots, X_{1n}$ plus all its final uses. We thus have a row for the coal industry of the form:

$$X_1 = \sum_{j=1}^{n} X_{1j} + X_{1C} + X_{1G} + X_{1I} + X_{1E} \qquad (11.1)$$

But the (domestic) output of coal must also equal the value of inputs into the coal industry plus the value added to those inputs by employing factors of production to work on them plus imports. We thus have a column for the coal industry of the form:

$$X_1 = \sum_{i=1}^{n} X_{i1} + W_1 + R_1 + D_1 + P_1 + M_1 \qquad (11.2)$$

Input Coefficients

The second stage in the practical use of input–output analysis is to derive input coefficients from the inter-industry section of the transactions table. This is done very simply by dividing each column entry in the matrix by the sum of the column. If we denote the input coefficient a_{ij}, then $a_{ij} = X_{ij}/X_j$. The input coefficient a_{ij} thus gives the amount of purchases from each industry to support one unit of output of industry j. If output was measured in pounds sterling and a_{ij} equalled 0.1, this would mean that every pound's worth of output of industry j would require 10p worth of input from industry i.

$X_{ij} = a_{ij}X_j$, and our equation (11.1) in general form can now be written:

$$X_i = \sum_{j=1}^{n} a_{ij}X_j + X_{iC} + X_{iG} + X_{iI} + X_{iE} \qquad (11.3)$$

With a series of equations of this nature for each sector, representing the rows in the processing sector of the transactions matrix, it is possible, through the use of the input coefficients, and with the aid of matrix algebra, to work out what the effect will be of changes in demand for the output of one sector on the output of all other sectors. Equation (11.3) for all industries, $i = 1, \ldots, n$, becomes a system of n simultaneous equations in n unknown variables which can be solved if certain conditions are satisfied. The technique is to specify the final demands for each industry, i, and then to determine the X_is from the new values of the input requirements, which give both the *direct* and *indirect* requirements from each industry.

In specifying the final demands for each industry, one obtains from equation (11.3) the following set of relations for each industry:

$$X_i - \sum_{j=1}^{n} a_{ij}X_j = Y_i \qquad i = 1, \ldots, n \qquad (11.4)$$

where Y_i is total final demand, X_i is total output, and $\sum_{j=1}^{n} a_{ij}X_j$ is the sum of intermediate demands. The solution to the problem of finding the values of all X_is which satisfy all the final demands may be written in the form:

$$X_i = b_{i1}Y_1 + b_{i2}Y_2 + \ldots + b_{in}Y_n \qquad (i = 1 \ldots, n) \qquad (11.5)$$

The coefficients $b_{i1}, \ldots, n$ give, per pound of delivery to final demand made by the industries listed along the top of the inter-industry matrix, the total output directly and indirectly required from industries listed at the left of the matrix. Equation (11.5) therefore gives the total output (X) of industry (i) consistent with the final demands for all other industries' products ($Y_1, \ldots, Y_n$).

These equations for each industry represent a transformation of the original equation (11.4) in which a new set of constants, b_{ij}s, derived from the original parameters (a_{ij}s). The new equations are referred to as the **general solution** and can be found, in difficult cases involving more than two or three equations with two or three unknowns, by the technique of **inversion of the matrix**, i.e. the inversion of the set of equations (11.4) in matrix form.

Let us now express, therefore, our input–output problem in matrix form and, using a little elementary matrix algebra, show how a general solution is arrived at by matrix inversion. For ease of exposition, and also to compare our results using a simple iterative procedure, we shall take two sectors and two outputs only.[1]

With two industries the equations of type (11.4) become:

$$\begin{aligned} X_1 - a_{11}X_1 - a_{12}X_2 &= Y_1 \\ X_2 - a_{21}X_1 - a_{22}X_2 &= Y_2 \end{aligned} \qquad (11.6)$$

Or in matrix form:

$$\begin{bmatrix} 1 - a_{11} & -a_{12} \\ -a_{21} & 1 - a_{22} \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \end{bmatrix} = \begin{bmatrix} Y_1 \\ Y_2 \end{bmatrix} \qquad (11.7)^2$$

The system in equation (11.7) may also be written as:

$$\left[\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} - \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}\right] \begin{bmatrix} X_1 \\ X_2 \end{bmatrix} = \begin{bmatrix} Y_1 \\ Y_2 \end{bmatrix} \qquad (11.8)$$

where $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ is an identity matrix $(I)^3$ and $\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$ is the matrix of input–output coefficients (A). In matrix notation our input–output system in equation (11.8) may be written as:

$$(I - A)X = Y \qquad (11.9)$$

$I - A$ is often called the **Leontief matrix**, named after the 'father' of input–output analysis, Wassily Leontief. It follows that:

$$X = (I - A)^{-1}Y \qquad (11.10)$$

that is, to solve for X, given Y, we need to find the inverse of the Leontief matrix, $I - A$.

A Digression on Matrix Inversion

The inverse of a matrix, Z, is another matrix B which when multiplied by Z gives the identity matrix I. This corresponds to the inversion of real numbers in ordinary algebra where b is the inverse of a if $ab = 1$. Similarly in matrix algebra, B is the inverse of Z if $ZB = I$. Thus the identity matrix in matrix algebra plays a similar role to the number 1 in ordinary algebra. Hence B is the inverse of Z if:

$$\begin{bmatrix} z_{11} & z_{12} \\ z_{21} & z_{22} \end{bmatrix} \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \qquad (11.11)$$

By multiplying the matrices, equation (11.11) would give four equations in four unknowns, and it would then be possible to solve for the elements in the inverse matrix b_{11}, b_{12}, b_{21}, b_{22}. By simple arithmetic:

$$b_{11} = \frac{z_{22}}{z_{11}z_{22} - z_{12}z_{21}}$$

$$b_{12} = \frac{-z_{12}}{z_{11}z_{22} - z_{12}z_{21}}$$

$$b_{21} = \frac{-z_{21}}{z_{11}z_{22} - z_{12}z_{21}}$$

$$b_{22} = \frac{z_{11}}{z_{11}z_{22} - z_{12}z_{21}}$$

Notice that the denominator of the elements of the inverse matrix is the same in all cases, namely the product of the elements of the principal diagonal in the Z matrix minus the product of the other diagonal. This is called the **determinant** of the matrix.

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[1] More complicated, real-life situations require a greater knowledge of matrix algebra than can be given here, but good introductions can be found in Miernyk (1965); Peston (1969); and Mills (1969).

[2] (11.7) is equivalent to (11.6) by multiplying each element in the rows of the 2 × 2 matrix by the equivalent element in the column vector of Xs.

[3] An identity matrix is a square matrix with 1s down its principal diagonal and zeros everywhere else. The importance of the identity matrix in matrix algebra is discussed below.

In the language of matrix algebra **the inverse of a matrix is the adjoint of the matrix divided by the determinant**, i.e.

$$Z^{-1} = \frac{1}{|Z|} \cdot \text{adjoint } Z \qquad (11.12)$$

where | | denotes determinant. In general (for a square matrix of any dimension) we can write the determinant as:

$$\begin{aligned}|Z| &= z_{11}|M_{11}| - z_{12}|M_{12}| \\ &\quad + \ldots -z_{1j}|M_{1j}| \qquad (11.13)\end{aligned}$$

where $|M_{11}|$, $|M_{12}|$, etc. are sub-determinants of Z called **minors.** Each element in Z has a minor. For example, in the 2 × 2 case the minor of the element z_{11} is denoted by $|M_{11}|$ and is obtained by deleting the first row and first column of the Z matrix. Thus $|M_{11}|$ of Z is z_{22}. Similarly, $|M_{12}|$ of Z is z_{21}.

It follows from equation (11.13) in the 2 × 2 case that:

$$|Z| = \begin{bmatrix} z_{11} & z_{12} \\ z_{21} & z_{22} \end{bmatrix} = z_{11}z_{22} - z_{12}z_{21} \qquad (11.14)$$

which is the denominator of the elements of the inverse matrix b_{11}, b_{12}, b_{21}, b_{22} above. In the 3 × 3 case we would have, using (11.13) and the rules for obtaining minors:

$$\begin{aligned}|Z| = \begin{bmatrix} z_{11} & z_{12} & z_{13} \\ z_{21} & z_{22} & z_{23} \\ z_{31} & z_{32} & z_{33} \end{bmatrix} &= z_{11}\begin{bmatrix} z_{22} & z_{23} \\ z_{32} & z_{33} \end{bmatrix} \\ &\quad - z_{12}\begin{bmatrix} z_{21} & z_{23} \\ z_{31} & z_{33} \end{bmatrix} + z_{13}\begin{bmatrix} z_{21} & z_{22} \\ z_{31} & z_{32} \end{bmatrix} \\ &= z_{11}(z_{22}z_{33} - z_{32}z_{23}) \\ &\quad - z_{12}(z_{21}z_{33} - z_{23}z_{31}) \\ &\quad + z_{13}(z_{21}z_{32} - z_{22}z_{31})\end{aligned}$$

and similarly for matrices of higher dimensions.

The adjoint of Z is defined as the transpose of all the co-factors of the matrix. The co-factor of an element is that element's minor with the appropriate sign attached. If the sum of the subscripts (ij) of the minor is an even number (e.g. M_{11}) the co-factor will have a positive sign. If the sum of the subscripts is an odd number (e.g. M_{12}), the co-factor will have a negative sign. In the 2 × 2 case the minors of the matrix Z will be:

$$M = \begin{bmatrix} z_{22} & z_{21} \\ z_{12} & z_{11} \end{bmatrix}$$

The co-factor matrix will therefore be:

$$C = \begin{bmatrix} z_{22} & -z_{21} \\ -z_{12} & z_{11} \end{bmatrix}$$

Now the transpose of a matrix C is another matrix C′, with the rows and columns interchanged. Hence:

$$C' = \begin{bmatrix} z_{22} & -z_{12} \\ -z_{21} & z_{11} \end{bmatrix} \qquad (11.15)$$

Thus, from our definition of an inverse matrix in equation (11.12), we have in the 2 × 2 case (from equations (11.14) and (11.15)):

$$Z^{-1} = \frac{1}{|Z|} \times \text{adjoint } Z = \frac{1}{z_{11}z_{22} - z_{12}z_{21}} \times \begin{bmatrix} z_{22} & -z_{12} \\ -z_{21} & z_{11} \end{bmatrix} \qquad (11.16)$$

If B is the inverse of Z then the elements of the inverse b_{11}, b_{12}, b_{21}, b_{22} can be seen to be the same as those derived by simple arithmetic from the system in equation (11.11).

The General Solution to the Input–Output Model

It is clear from equation (11.10) that once the Leontief matrix $(I - A)$ has been inverted it is possible to obtain a general solution to the simultaneous equation system of n unknown outputs (the Xs). From what we have said above about matrix inversion, $(I - A)^{-1}$ is some matrix which we can call B, which when multiplied by $I - A$ gives the identity matrix I. We now have:

$$X = BY \tag{11.17}$$

In other words, each industry's output is equal to the sum of the elements of the final demand matrix Y (which is a column vector $n \times 1$) times the coefficients of the inverse of the matrix $(I - A)$. In the 2×2 case:

$$\begin{bmatrix} X_1 \\ X_2 \end{bmatrix} = \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{bmatrix} \begin{bmatrix} Y_1 \\ Y_2 \end{bmatrix} \tag{11.18}$$

This is exactly what is stated in equation form in (11.5). By matrix multiplication:

$$X_1 = b_{11}Y_1 + b_{12}Y_2$$
$$X_2 = b_{21}Y_1 + b_{22}Y_2$$

In summary notation:

$$X_i = \sum_{j=1}^{n} b_{ij}Y_j \quad (i = 1, \dots n) \tag{11.19}$$

and for changes in Ys:

$$\Delta X_i = \sum_{j=1}^{n} b_{ij}\Delta Y_j \quad (i = 1, \dots n) \tag{11.20}$$

The outputs of all industries will be consistent with the final demand for the products of all industries. The b_{ij}s give the direct and *indirect* requirements from industries $1, \dots, n$ per pound of final demand for the products of industries $1, \dots, n$. The column sum of the b_{ij}s gives the so-called **matrix multiplier** of each of the industries listed at the top of the columns. For example, the matrix multiplier attached to industry 1 is $b_{11} + b_{21}$. The matrix multiplier is a useful concept in planning because it gives a measure of the impact of the expansion of one activity on the level of output of all other activities in the system. It is possible to identify, therefore, which activities may give the greatest stimulus to others through the linkages in the system.

Table 11.2 *Input–Output Coefficients*

Purchases / *Sales*	*Coal*	*Steel*
Coal	0.1	0.4
Steel	0.3	0.2

Now let us consider a simple arithmetical example. Suppose that the direct input–output coefficients (the a_{ij}s) for the steel and coal industries of a country are as given in **Table 11.2.** We wish to show what the output of coal and steel must be to satisfy certain final demands for steel and coal.

$$A = \begin{bmatrix} 0.1 & 0.4 \\ 0.3 & 0.2 \end{bmatrix}$$

$$I - A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} - \begin{bmatrix} 0.1 & 0.4 \\ 0.3 & 0.2 \end{bmatrix}$$

$$= \begin{bmatrix} 0.9 & -0.4 \\ -0.3 & 0.8 \end{bmatrix}$$

By matrix inversion to derive the elements of the inverse matrix:

$$b_{11} = 1\tfrac{1}{3}$$

$$b_{12} = \tfrac{2}{3}$$

$$b_{21} = \tfrac{1}{2}$$

$$b_{22} = 1\tfrac{1}{2}$$

Thus:

$$(I - A)^{-1} = \begin{bmatrix} 1\frac{1}{3} & \frac{2}{3} \\ \frac{1}{2} & 1\frac{1}{2} \end{bmatrix} = B$$

If final demands are:

$$Y = \begin{bmatrix} 15 \\ 10 \end{bmatrix}$$

then total industry outputs consistent with this final demand for both products would be:

$$X = \begin{bmatrix} 1\frac{1}{3} & \frac{2}{3} \\ \frac{1}{2} & 1\frac{1}{2} \end{bmatrix} \begin{bmatrix} 15 \\ 10 \end{bmatrix}$$

$$= \begin{bmatrix} 1\frac{1}{3} \times 15 + \frac{2}{3} \times 10 \\ \frac{1}{2} \times 15 + 1\frac{1}{2} \times 10 \end{bmatrix} = \begin{bmatrix} 26\frac{2}{3} \\ 22\frac{1}{2} \end{bmatrix}$$

or coal output $= 1\frac{1}{3} \times 15 + \frac{2}{3} \times 10 = 26\frac{2}{3}$, and steel output $= \frac{1}{2} \times 15 + 1\frac{1}{2} \times 10 = 22\frac{1}{2}$.

We can also solve for the *change* in each sector's output following a change in final demand. Suppose, for instance, the final demand for steel is projected to rise from 10 to 15. From our inverse matrix we can work out by how much coal and steel output will have to increase in order to meet this increase in final demand. The new final demand vector is:

$$Y = \begin{bmatrix} 15 \\ 15 \end{bmatrix}$$

and the output of the two industries consistent with this new demand vector is:

$$X = \begin{bmatrix} 1\frac{1}{3} & \frac{2}{3} \\ \frac{1}{2} & 1\frac{1}{2} \end{bmatrix} \begin{bmatrix} 15 \\ 15 \end{bmatrix} = \begin{bmatrix} 30 \\ 30 \end{bmatrix}$$

Therefore coal output must rise by $3\frac{1}{3}$ from $26\frac{2}{3}$, and steel output must rise by $7\frac{1}{2}$ from $22\frac{1}{2}$ to 30. Given the inverse matrix, any manipulation of the final demand vector is possible and a general solution can be reached.

Our result using matrix methods can now be checked by going back to the original 2 × 2 matrix of direct input coefficients given in **Table 11.2** and calculating step by step the direct and indirect demands made upon the steel and coal industries as a result of the increase in final demand for steel. The task is laborious, but let us proceed if only to underline the beauty and usefulness of matrix methods.

We use an iterative procedure analogous to that used in solving a single equation national income model with a given propensity to consume and a postulated change in autonomous demand. In inter-industry analysis, however, there is more than one 'multiplier' coefficient to contend with and there may be several changes in final demands.

The ultimate change in output must equal the sum of the direct and indirect effects of the change in final demand. We assume that the first increment of production of commodity X_i is equal to the increase in final demand for X_i. The first-round effects on production in each sector are then given by the input–output coefficients. The second-round effects are given by derived demands in the first round multiplied by the input–output coefficients, and so on.

In our two-sector example, the primary effect of an increase in demand for steel of 5 is an increment of steel production of the same amount, i.e. the primary effect on steel is 5.

The first-round effect on steel is
$0.2 \times 5 = 1$

The first-round effect on coal is
$0.4 \times 5 = 2$

These derived demands, following the initial increase in demand, are then multiplied by their respective input coefficients.

$$\left.\begin{array}{r} \text{Thus, the second-round effect} \\ \text{on steel is } 0.2 \times 1 = 0.2 \\ \text{and } 0.3 \times 2 = 0.6 \end{array}\right\} = 0.8$$

$$\left.\begin{array}{r}\text{and the second-round effect on}\\ \text{coal is } 0.4 \times 1 = 0.4\\ \\ 0.1 \times 2 = 0.2\end{array}\right\} = 0.6$$

The second-round derived demand figures are further multiplied by their respective input coefficients.

$$\left.\begin{array}{r}\text{Thus, the third-round effect on}\\ \text{steel is } 0.2 \times 0.8 = 0.16\\ \\ \text{and } 0.3 \times 0.6 = 0.18\end{array}\right\} = 0.34$$

$$\left.\begin{array}{r}\text{and the third-round effect on}\\ \text{coal is } 0.4 \times 0.8 = 0.32\\ \\ 0.1 \times 0.6 = 0.06\end{array}\right\} = 0.38$$

and so on,

Summing after three rounds, we have:

Change in steel output is
$= 5 + 1 + 0.8 + 0.34 = 7.14.$

Change in coal output is
$= 2 + 0.6 + 0.38 = 2.98.$

These compare with out *final* results by matrix methods of 7$\frac{1}{2}$ and 3$\frac{1}{3}$ for steel and coal, respectively.

Calculation by this iterative procedure is clearly tedious and becomes impossibly complicated with more than five or six sectors to cope with. Similarly, matrix inversion by hand is laborious and complicated, but fortunately there is recourse to the computer. When it comes to input–output work for practical policy-making purposes, a computer is indispensable. To be of much practical use, the degree of disaggregation required in input–output analysis is such that work would be impossible without mechanical aids. A regular computer will invert a 30 × 30 matrix in less than a second.

Forecasting Import Requirements

What will happen to imports and the balance of payments with a change in final demand can also be estimated from the general solution to the input–output model. Exports are assumed to be determined exogenously, but imports are endogenous. The changes in the import requirements of industries (intermediate imports) may be calculated by multiplying the required change in each industry's output by the industry's import coefficient (defined as $m_i = M_i/X_i$), and summing. Imports to meet the new final demand directly may be calculated in the same way by multiplying the change in each component of final demand by the import-content coefficient of final demand, e.g. where m_C is defined as the ratio of consumption imports to total consumption, m_I is the import coefficient attached to investment etc.

If imports into each industry are disaggregated by the column cells showing which activity they belong to, then total intermediate imports may be written as:

$$MX = M[I - A]^{-1}\,Y = M^{*}Y \qquad (11.21)$$

where M is the matrix of direct import coefficients, and M^* is the matrix of direct plus indirect import coefficients. In the 2 × 2 case we have:

$$\begin{bmatrix} m_{11} & m_{12}\\ m_{21} & m_{22}\end{bmatrix}\begin{bmatrix} X_1\\ X_2\end{bmatrix} = \qquad (11.22)$$

$$\left[\begin{bmatrix} m_{11} & m_{12}\\ m_{21} & m_{22}\end{bmatrix}\begin{bmatrix} b_{11} & b_{12}\\ b_{21} & b_{22}\end{bmatrix}\right]\begin{bmatrix} Y_1\\ Y_2\end{bmatrix}$$

Therefore:

$$\begin{aligned} M_1 &= m_{11}X_1 + m_{12}X_2\\ &= (m_{11}b_{11} + m_{12}b_{21})\,Y_1\\ &\quad + (m_{11}b_{12} + m_{12}b_{22})\,Y_2 \end{aligned}$$

and

$$\begin{aligned} M_2 &= m_{21}X_1 + m_{22}X_2 \\ &= (m_{21}b_{11} + m_{22}b_{21})\ Y_1 \\ &\quad + (m_{21}b_{12} + m_{22}b_{22})\ Y_2 \end{aligned}$$

If imports also go directly into final demand we have:

$$\begin{bmatrix} M_1 \\ \\ M_2 \end{bmatrix} = \begin{bmatrix} m_{1I} & m_{1C} \\ \\ m_{2I} & m_{2C} \end{bmatrix} \begin{bmatrix} I \\ \\ C \end{bmatrix} = M^D Y^D \quad (11.23)$$

(assuming just two components of final demand: investment [I] and consumption [C]). Therefore:

$$M_1 = m_{1I}I + m_{1C}C$$

and

$$M_2 = m_{2I}I + m_{2C}C$$

Total imports = $M^*Y + M^DY^D$

Changes in import requirements may then be calculated by specifying the changes in final demand, ΔY and ΔY^D, and assuming that the average and marginal import coefficients are the same.

Some imports will be competitive with domestic production; others not. In either case, the input–output model may be simulated to calculate the effects throughout the system of import substitution. In the case of replacing competitive imports, each of the column entries would have to be adjusted and the input–ouput coefficients recalculated. In the case of non-competitive imports, a new row and column would have to be added to the inter-industry matrix, and the Leontief inverse recalculated to ascertain the likely impact.

If imports into each industry remain aggregated, as in **Table 11.1**, we may simply write the aggregate level of imports as:

$$\begin{aligned} M = \sum_{i=1}^{n} m_iX_i + m_CC + m_GG \quad (11.24) \\ + m_II + m_EE \end{aligned}$$

Since $\Delta X_i = \sum_{j=1}^{n} b_{ij}\Delta Y_j$ (from equation (11.20), changes in import requirements may be calculated as:

$$\begin{aligned} \Delta M = \sum_{i=1}^{n} \sum_{j=1}^{n} m_ib_{ij}\Delta Y_j \quad (11.25) \\ + m_C\Delta C + m_G\Delta G \\ + m_I\Delta I + m_E\Delta E \end{aligned}$$

In the 2 × 2 case:

$$\begin{aligned} \Delta M = {} & m_1(b_{11}\Delta Y_1 + b_{12}\Delta Y_2) \\ & + m_2(b_{21}\Delta Y_1 + b_{22}\Delta Y_2) \\ & + m_C\Delta C + m_G\Delta G + m_I\Delta I \\ & + m_E\Delta E \quad (11.26) \end{aligned}$$

Forecasting Labour Requirements

If we have estimates of employment coefficients industry by industry, defined as $1_i = L_i/X_i$, we can estimate labour requirements from the input–output model, given specified changes in final demand. Total labour requirements can be expressed as:

$$L = \sum_{i=1}^{n} 1_iX_i + 1_yY \quad (11.27)$$

where 1_y is the employment coefficient of the final demand sector, e.g. of government employment of civil servants.

Assuming the marginal employment coefficient is equal to the average, the change in labour requirements is:

$$\Delta L = \sum_{i=1}^{n} 1_i\Delta X_i + 1_y\Delta Y \quad (11.28)$$

and, since $\Delta X_i = \sum_{j=1}^{n} b_{ij}\Delta Y_j$

$$\Delta L = \sum_{i=1}^{n} \sum_{j=1}^{n} 1_ib_{ij}\Delta Y_j + 1_y\Delta Y \quad (11.29)$$

Thus, given the specified changes in final demand for each industry's output (ΔY_js), and given the elements of the Leontief inverse (b_{ij}s), the change in total labour requirements can be forecast.

Forecasting Investment Requirements

Changes in output to meet specified changes in final demand over a plan period will require additions to the capital stock. In a normal input–output table, as **Table 11.1**, all that is usually specified is the total amount of each sector's output that is allocated for the purpose of investment, without specifying the activities it goes into. In principle, however, a table of investment flows or capital transactions could be prepared, just as for current inputs, as in **Table 11.3**.

Table 11.3 *Inter-Industry Capital Transactions*

Industries	*1*	*2*
1	I_{11}	I_{12}
2	I_{21}	I_{22}

From this table the incremental capital–output ratios (ICORs) for each sector can be calculated by dividing each column entry by the *change* in output of the industry concerned over an accounting period. We would then have a matrix of incremental capital–output coefficients, with the sum of the sector coefficients adding up to the incremental capital–output ratio (c_i) for the industry as a whole, as in **Table 11.4**. In practice, with a number of sectors, the sub-sectoral ratios will all be very small.

Table 11.4 *Matrix of Capital–Output Coefficients*

Industries	*1*	*2*
1	1.0	0.75
2	4.0	2.25
Aggregate ICOR (c_i)	5.0	3.00

Table 11.4 says that industry 1 needs four units of extra capital from industry 2 to produce a unit flow of output, and one unit of extra capital from itself. Likewise for industry 2, 0.75 units of capital are needed from industry 1 and 2.25 units from itself to produce a unit flow of output.

Total investment requirements may then be written as:

$$I = \Delta K = \sum_{i=1}^{n} c_i \Delta X_i \tag{11.30}$$

where $c_i = \Delta K_i / \Delta X_i$ is the aggregate ICOR for industry i.

Since $\Delta X_i = \sum_{j=1}^{n} b_{ij} \Delta Y_j$, we have

$$I = \Delta K = \sum_{i=1}^{n} \sum_{j=1}^{n} c_i b_{ij} \Delta Y_j \tag{11.31}$$

Thus, given the specified changes in final demand; the elements of the Leontief inverse, and information on investment flows and capital–output ratios, investment requirements industry by industry, and in total, can be forecast.

Backward and Forward Linkages

The essence of the inter-industry transactions table is that it shows linkages between industries. Backward linkages refer to where an industry get its inputs from and forward linkages refer to where an industry's output goes. A precise numerical measure of the extent of an industry's backward and forward linkages is possible. The backward linkages of any jth sector (L_{Bj}) can be measured as the ratio of purchased intermediate inputs to the total value of production, that is:

$$L_{Bj} = \frac{\sum_i X_{ij}}{X_j} = \sum_i a_{ij}$$

The forward linkages of any ith sector (L_{Fi}) can be measured as the ratio of inter-industry demand to total demand, that is:

$$L_{Fi} = \frac{\sum_j X_{ij}}{X_i}$$

where X_i is the sum of inter-industry $(\sum_j X_{ij})$ and final (Y_i) demand for industry i. Industries can be ranked according to their backward or forward linkages, or their sum. Both give a measure of the stimulus that one industry may give to others.

Triangularised Input–Output Tables

A visual impression of the structural interdependence of different industries can be obtained by triangularising the inter-industry transactions matrix to show interdependence on both the input and output sides. Two criteria may be applied in triangularising matrices, or a combination of both. One is to list the sector with the largest number of zero-output entries at the top of the table and the others in descending order. The second is to order rows so that final demand as a proportion of total output declines as one reads down the table. Either way a line drawn from the top left-hand corner of the table to the bottom right should reveal a big difference in the magnitude of the cell entries, and the number of zeros, between the 'bottom' and 'top' triangles, as illustrated in **Table 11.5**. In real life the triangularised matrix would not look quite so symmetrical, but we illustrate the principle. In this example it can be seen at a glance that industry (5) has high backward linkages but no forward linkages, while industry (4) has strong forward linkages but no backward linkages. One usefulness of triangularising matrices for different countries is that other countries can see at a glance what industries they might encourage if the prevailing economic conditions are similar.

Table 11.5 *A Hypothetical Triangularised Inter-Industry Transactions Matrix*

Industries	5	2	3	1	4
5	3	0	0	0	0
2	8	1	0	0	0
3	6	2	3	0	0
1	12	4	4	2	0
4	9	8	6	2	2

The Input–Output Table of Papua New Guinea

Many developing countries have constructed input–output tables to assist them in the planning process, and they are put to a variety of uses, some of which we have already described. To give just one example we reproduce, as **Table 11.6**, the 1970 input–output table for Papua New Guinea which was compiled by Parker of the Australian National University.[1]. The inter-industry transactions matrix has been consolidated from the original forty-six productive sectors to eleven. The table is fairly self-explanatory and follows the standard form as outlined in **Table 11.1.** Parker uses the table mainly for the purpose of making projections for the economy in 1978 based on estimates of increases in final demand for each of the industries identified and on the basis of known changes in the structure of production over the period, including the introduction of new industries and import-substitute activities. The Leontief matrix is then inverted and estimates made of the output of each sector in 1978 consistent with the projected final demands (including exports) and the forecast structural changes. A comparison of the 1978 projections with the situation in 1970 shows up the growth sectors of the economy, and the structural changes necessary if the projections are to be fulfilled. The implications of the projections for the balance-of-payments are also considered.

To sum up, we can say that input–output analysis serves three broad purposes in development planning. First, it offers the possibility of providing a set of consistent projections for an economy indicating broadly the structure of the economy that might emerge given a country's development strategy. The implications of alternative develop-

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[1] Parker (1974). Parker's article is a succinct illustration of input–output analysis and the uses to which it may be put.

Table 11.6 ***Inter-Industry Transactions, Papua New Guinea, 1970 ($m.; purchasers' values)***

Item	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*Personal consumption*	*Net current expenditure**	*Gross domestic capital*		*Exports*	*Total demand*
														Public	*Private*†		
(1) Agriculture	1.53		6.86				0.27	0.18		0.02		8.06			7.12	53.40	77.44
(2) Fishing, forestry, mining	0.01		3.24	0.04			0.04	0.03		0.01		1.67			–0.07	5.78	10.75
(3) Manufacturing	5.73	0.28	4.48	26.61	7.53	1.57	1.25	4.96	0.79	1.60		32.42		0.69	1.51	13.45	102.87
(4) Building, construction	0.26		0.15	0.47	0.13	0.45	0.77	11.33	0.69	0.05				36.24	63.91		114.45
(5) Transport communication	2.97	0.20	3.06	2.83	2.22	1.04	3.22	10.83	0.18	7.07		11.11	–0.34	0.26	0.28	4.85	49.78
(6) Commerce	3.52	0.96	11.19	6.14	2.57	0.51	0.31	0.18	0.18	0.96		20.53		0.76	7.99	2.46	58.26
(7) Education, health									0.04			3.35	40.76			0.03	44.18
(8) Government services, n.e.i.	0.63	0.72	0.13	0.73	0.25	1.08	0.01	0.13	3.96	0.21			81.10	6.90		0.23	96.08
(9) Other services			0.02		0.10	4.00	0.13	0.53		5.59		15.17	5.73			2.77	34.04
(10) Business expenses	1.16	0.32	3.23	5.49	1.71	9.36	0.37	1.43	2.71							2.43	28.21
(11) Non-market production												185.50		31.70	6.70		223.90
Wages & salaries																	
Indigenous	13.53	1.53	6.83	8.50	5.66	4.90	9.92	15.38	7.99								74.24
Non-indigenous	2.90	0.80	11.60	12.31	10.11	8.47	20.08	36.67	7.29								110.23
Operating surplus‡	37.56	2.71	17.40	5.90	4.58	21.13	1.28	0.23	7.43		223.90						322.12
Depreciation	2.01	0.70	3.99	4.22	5.77	3.19	0.06	0.19	1.70								21.83
Net indirect tax	0.13	0.13	7.74	1.20	0.79	0.78	0.03	0.03	0.23	0.55		10.49		0.09	2.58	0.85	25.62
Imports c.i.f.	5.50	2.40	22.95	40.01	8.36	1.78	6.44	13.98	0.85	12.15		78.80		14.71	58.08	4.10	270.11
Sales by final buyers														–1.15	0.57	0.58	
Total supply	77.44	10.75	102.87	114.45	49.78	58.26	44.18	96.08	34.04	28.21	223.90	367.10	127.25	90.20	148.67	90.93	1644.11

* Net current expenditure of public authorities, missions and financial enterprises.
† Including additions to stocks.
‡ Including indigenous non-market income.
Source: Parker, 'An Interindustry Approach to Planning in Papua New Guinea' (1974).

ment strategies can also be explored. Second, it shows the structural changes that must occur in the process of growth, which no aggregative macroeconomic model can do. Third, the very construction of the input–output table provides structural information on a disaggregated basis which may become invaluable in other aspects of development planning.

The Assumptions of Input–Output Analysis[1]

Now let us briefly turn to the assumptions underlying input–output analysis and consider their validity. The basic properties of traditional (Leontief-type) input–output models are fourfold: first, that there are no joint products, which means that each commodity is produced by only one industry and each industry produces only one product; second, that technical coefficients are fixed, i.e. no substitutability between inputs, so that input functions are linear and the marginal input coefficient is equal to the average; third, that the total effect of carrying on several activities is the sum of the separate effects, ruling out external economies and diseconomies; and last, that technical progress is static and production is subject to constant returns. All these assumptions are necessary if the input–output coefficients are to be constant and the estimated inputs and outputs are to balance at the aggregate level.

The validity of these assumptions is of course open to question, especially over the long run.

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[1] For an excellent account of the practical problems of constructing input–output tables in developing countries, see Bulmer-Thomas (1982).

Indeed, we know that changes do occur of a type which input–output analysis denies. The question is essentially an empirical one: how large are the errors associated with sacrificing accuracy for convenience? In the short run they may not be substantial, and the use of input–output relations for forecasting and simulation within periods of five years may not yield results that are too far wide of the mark. There may not be much substitutability between inputs in the short run owing to the nature of technology or the comparative stability of relative factor prices. Over the long run, however, changes in the ratio of factor prices, and technical progress, may alter input–output coefficients substantially in physical terms.[1] Similarly, the composition of demand may be assumed to be fairly static in the short run, but is liable to considerable change in the longer run. If commodities with different input coefficients are grouped together in the same sectors, a changing pattern of demand will alter a sector's input–output coefficient automatically. To overcome this problem it is advisable to use the similarity of input structures as a criterion for the aggregation of activities in the original input–output table.

The most serious criticism of input–output analysis for projection, forecasting and simulation purposes is the fact that the marginal or incremental input coefficient may differ substantially from the average relationship embodied in the matrix. With technical change, increasing returns to scale, and the changing structure of international trade, marginal input coefficients may diverge substantially from average coefficients over time. Needless to say, this possibility could lead to inaccurate forecasts of the need for certain commodities on the basis of projections of final demand. But there are ways of overcoming this inherent weakness of traditional input–output economics. The problem is lessened if the transactions table from which the input coefficients are derived can be produced at regular and frequent intervals. With better methods of data collection, this itself is more feasible. The problem can also be overcome to a certain extent if some satisfactory adjustment can be made to 'out-of-date' coefficients to allow for such factors as changes in technology and the pattern of trade. It is fairly common practice, for instance, to adjust out-of-date national coefficients for a sector by the coefficients prevailing in the best-practice techniques in the sector. And for developing countries, or backward regions within a nation, it can be assumed that within a certain time period they will have the coefficients prevailing at the present in other, more advanced, countries or regions.

In growth and planning exercises, knowledge of input–output relationships is of greatest use when growth is based on the expansion of domestic demand and where there is considerable interdependence between activities. We noted earlier, however, that typically in developing countries the backward and forward linkages between sectors are not very great. Unless there is a great deal of consolidation of sectors, many of the cells in the inter-industry transactions matrix are likely to be empty. The reason is that a great deal of output goes directly to meet final demand, particularly into exports. If growth is primarily based on exports, the traditional input–output table is of limited use, although there are a number of ways in which it may be modified for the general purpose of assisting the achievement of balance within the economy.[2]

Input–Output, Linkage Analysis and Development Strategy

We discussed in Chapter 7 the thesis of the distinguished development economist, Professor Hirschman, that the scarcest resource in developing countries is a shortage of decision-takers, which leads him to the conclusion that development strategy ought to proceed in such a way as to set

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[1] If the coefficients from one time period to the next are calculated at current prices, then changes in relative prices will not change the value coefficients if the elasticity of substitution between inputs is unity.

[2] For Zambia, for example, Seers has used the inter-industry matrix in a social accounting framework for the wider purpose of balance in sectors of the economy other than the production sector. See Seers (1966).

Table 11.7 ***Classification of Industries by Backward (L_B) and Forward (L_F) Linkages***

	Low L_F			*High L_F*		
	III. Final Manufacture			II. Intermediate Manufacture		
		L_F	L_B		L_F	L_B
High L_B	Apparel	0.12	0.69	Iron and steel	0.78	0.66
	Shipbuilding	0.14	0.58	Paper and products	0.78	0.57
	Leather and products	0.37	0.66	Petroleum products	0.68	0.65
	Processed foods	0.15	0.61	Nonferrous metals	0.81	0.61
	Grain mill products	0.42	0.89	Chemicals	0.69	0.60
	Transport equipment	0.20	0.60	Coal products	0.67	0.63
	Machinery	0.28	0.51	Rubber products	0.48	0.51
	Lumber and wood products	0.38	0.61	Textiles	0.57	0.69
	Nonmetallic mineral products	0.30	0.47	Printing and publishing	0.46	0.49
	Other industry	0.20	0.43			
	IV. Final Primary Production			I. Intermediate Primary Production		
Low L_B	Fishing	0.36	0.24	Argriculture and forestry	0.72	0.31
	Transport	0.26	0.31	Coal mining	0.87	0.23
	Trade	0.17	0.16	Metal mining	0.93	0.21
	Services	0.34	0.19	Petroleum and natural gas	0.97	0.15
				Nonmetallic minerals	0.52	0.17
				Electric power	0.59	0.27

Source: Chenery and Watanabe (1958).

up pressures and obvious incentives for things to get done. Since, in any case, not everything can be done at once, the sequence of activities should be that which maximises what Hirschman calls 'induced decision-making'. This general view leads to two broad conclusions: first, there is a case to be made for unbalanced growth in order to promote overall growth, as we discussed in Chapter 7; second, activities should be encouraged which have the strongest linkage effects in input–output terms, in order to maximise induced decision-making.

In connection with the second point, three questions naturally arise: (i) what are the industries with high linkages? (ii) do countries tend to encourage the growth of sectors with high linkages? Is there a correlation *within* countries between a sector's growth rate and its total linkage index (the so-called **Hirschman compliance test**)? (iii) is there a correlation *across* countries between a country's overall growth rate and the Hirschman compliance index?

■ Empirical Studies of Linkages

One early empirical study of linkages was that of Chenery and Watanabe (1958), who took input–output tables for the US, Japan, Italy and Norway and computed backward and forward linkages for 29 sectors in each country, and found them to be very similar in each country. They therefore averaged the linkage measure for each sector across the four countries, and categorised industries into four groups, as shown in **Table 11.7**:

I High forward, low backward – Intermediate primary production

II High forward, high backward – Intermediate manufactures

Table 11.8 ***Sectoral Linkage Indexes and Comparison of Rankings: 18 × 18 1-0 Tables, Developed Countries***

	Total		*Chenery–Watanabe–Hirschman*		*Forward*	*Backward*
	L_r	*Rank*	*Rank*	*Class*	L_F	L_B
Food, beverage manufactures	2.43	1	7	III	0.223	0.743
Basic metals	2.40	2	1	II	0.887	0.660
Textiles	2.34	3	4	II	0.671	0.615
Clothing	2.33	4	8	III	0.126	0.639
Paper	2.24	5	3	II	0.726	0.609
Metal products and machinery	2.21	6	9	III	0.413	0.550
Chemicals and petroleum refining	2.19	7	2	II	0.697	0.630
Wood furniture	2.09	8	5	II	0.564	0.576
Construction	2.09	9	10	III	0.374	0.536
Leather	2.08	10	6	II	0.584	0.555
Other manufactures	2.02	11	17	IV	0.328	0.517
Rubber	1.99	12	13	I	0.586	0.496
Printing	1.99	13	14	I	0.564	0.482
Utilities	1.93	14	12	I	0.635	0.489
Minerals (nonmetallic)	1.91	15	11	I	0.767	0.478
Agriculture	1.81	16	16	I	0.623	0.405
Mining	1.70	17	15	I	0.715	0.385
Services	1.62	18	18	IV	0.438	0.303

Source: Yotopoulos and Nugent (1973).

III High backward, low forward – Final manufactures

IV Low backward, low forward – Final primary production

Intermediate primary products have high forward and low backward linkages because they tend to be processed domestically, but require few domestic inputs. Intermediate manufactures, however, also have high backward linkages because manufactures tends to demand more processed inputs than land based activities. Final manufactures have high backward linkages, but low forward linkages because they are consumed, invested or exported directly. Final primary production has both low backward and low forward linkages, because primary products require few domestic inputs and a large fraction of output is exported.

In terms of Hirschman's model, the best activities to encourage would be those in category II – namely intermediate manufactures – with high backward and forward linkages.

Yotopoulos and Nugent (1973) have also taken eleven input–output tables – six for developed countries (Canada, Israel, Japan, Sweden, UK and US) and five for developing countries (Chile, Greece, Korea, Mexico and Spain) and consolidate each table into an 18 × 18 matrix. They calculate for each sector, backward linkages, forward linkages and total linkage effects (measured as the matrix multiplier for each activity which therefore includes direct and indirect effects of each activity on others). As far as the strength of linkages is concerned, they find a close correspondence with the results of Chenery and Watanabe. They look separately at the results for developed and developing countries (see **Table 11.8** and **11.9**) and

Table 11.9 ***Sectoral Linkage Indexes and Comparison of Rankings: 18 × 18 1-0 Tables, Less Developed Countries***

	Total		*Chenery–Watanabe–Hirschman*		*Forward*	*Backward*
	L_T	*Rank*	*Rank*	*Class*	L_F	L_B
Leather	2.39	1	2	II	0.645	0.683
Basic metals	2.36	2	3	II	0.980	0.632
Clothing	2.32	3	8	III	0.025	0.621
Textiles	2.24	4	5	II	0.590	0.621
Food, beverage manufactures	2.22	5	7	III	0.272	0.718
Paper	2.17	6	1	II	0.788	0.648
Chemicals and petroleum refining	2.13	7	4	II	0.599	0.637
Metal products and machinery	2.12	8	9	III	0.430	0.558
Wood, furniture	2.07	9	6	II	0.582	0.620
Construction	2.04	10	10	III	0.093	0.543
Printing	1.98	11	14	IV	0.508	0.509
Other manufactures	1.94	12	16	IV	0.362	0.505
Rubber	1.93	13	15	IV	0.453	0.481
Minerals (nonmetallic)	1.83	14	11	I	0.870	0.517
Agriculture	1.59	15	17	IV	0.502	0.368
Utilities	1.49	16	12	I	0.614	0.296
Mining	1.47	17	13	I	0.638	0.288
Services	1.41	18	18	IV	0.378	0.255

Source: Yotopoulos and Nugent (1973).

find a considerable similarity in the structure of linkages between the two sets of countries, although, not surprisingly, the indices are generally higher for developed countries.

The Hirschman Compliance Index and the Growth of Countries

A simple test of the Hirschman compliance hypothesis is first to calculate each country's compliance index (i.e. the correlation between sector growth rates and their total linkage index) and then correlate the compliance index with each country's growth rate. Yotopoulos and Nugent do this taking 36 countries – 16 developed countries and 20 developing countries. The correlation across the two sets of countries (and all 36 countries) are positive but not statistically significant.

Yotopoulos and Nugent argue, however, that following a policy of encouraging the growth of sectors with high total linkages may produce an *unacceptable* degree of imbalance within an economy which may impair growth. Thus, the above test of the Hirschman compliance rule is an extreme test of the hypothesis of unbalanced growth since there is no limit to the desirable degree of imbalance. Yotopoulos and Nugent therefore propose what they call a **balanced growth version of the linkage hypothesis**. This hypothesis argues that a sector (i) should grow at the overall growth rate of a country (G_i) weighted by the total linkage index (L_{Ti}). The coefficient of variation (V_{Li}) in the actual sectoral growth rates, g_{ij}, around the linkage-weighted overall growth rate therefore measures the degree of imbalance relative to linkage-balanced growth, i.e.

$$V_{Lj} = \frac{1}{G_j}\sqrt{\frac{1}{n}\sum_{i=1}^{n} w_{ij}\,(g_{ij} - L_{Ti}\,G_j)^2} \qquad (11.32)$$

where w_{ij}'s are the weights of each industry in total output.

According to equation (11.32), country *j*'s growth is linkage-balanced when each sector's growth rate is proportional to each sector's total linkage index. A high V_{Lj} would indicate that a country has deviated from this 'optimum' balance. The lower V_{Lj} the greater the degree of linkage-balance achieved. Therefore the balanced growth version of the linkage hypothesis would be supported by finding a ***negative*** correlation across countries between the V_{Lj} for each country and its overall growth rate, *i.e.* the lower the index, the higher the growth rate should be, and vice versa. Yotopoulos and Nugent find the hypothesis supported across a total of 34 countries, and also separately for 15 developed countries and 19 developing countries.

We may conclude this section by saying that on the basis of the strength of linkages, policy-makers should favour manufacturing activities over agriculture or services. There is no support for the extreme Hirschman hypothesis that countries grow fast where the growth of high linkage industries has been fastest. But there is support for the balanced growth version of the linkage hypothesis, namely that countries have grown fastest where the growth of sectors has been proportional to the value of their total linkage index. This is a topic on which more work needs doing.

Questions for Discussion and Review

1. What does an input–output table show?
2. What are the major purposes of input–output analysis?
3. What are 'input–output coefficients', and what conditions must be fulfilled if they are to be stable through time?
4. What is the 'Leontief inverse matrix' and what does it show?
5. How would you derive the matrix multiplier for each industry from the Leontief inverse matrix?
6. Define the backward and forward linkages of each industry and how might linkage analysis be used in planning economic development.
7. Give examples of how you would use an input–output table for 'simulation' purposes?
8. What information would be required to use input–output analysis for forecasting investment requirements?
9. Show how the balance of payments implications of a given growth in final demand can be forecast by using input–output analysis.
10. How indispensable is input–output analysis as a planning technique?

■ Chapter 12 ■

The Programming Approach to Development

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The main task of development strategy is to ensure that resources will be forthcoming to meet the goals of a development programme, and that the resources are allocated efficiently subject to certain constraints. In our earlier discussion of resource allocation we were more concerned with the investment criteria that should be applied in the light of particular goals than with the efficiency with which resources were to be used, or whether the application of the criteria violated certain of the broader constraints mentioned. This was, in fact, a matter of necessity because ordinary marginal analysis is not appropriate to situations in which the aim is to obtain an 'optimum' solution subject to constraints which are not precisely specified (or what are called inequalities, e.g. that no more than R resources should be used). Programming, however, can provide a simultaneous solution to the three basic purposes of development planning, which are: the 'optimum' allocation of resources; efficiency in the use of resources (through the proper valuation of resources, and the avoidance of 'social' waste); and the balance between different branches of the national economy.

The essential feature of the programming approach is that it deals with a whole complex of interrelated projects rather than with a marginal project, and is concerned with much wider considerations than marginal analysis. The partial equilibrium approach in development planning is only justified if the number of projects is small or social considerations are taken into account in the application of investment criteria, as social cost–benefit analysis tries to do. The programming approach also tends to be more dynamic, looking at the development of the economy and the interrelationship between projects over a long period of time.

Programming in general is best described as the mathematical method for the analysis and derivation of optimum decisions which do not violate non-specific constraints. Theoretically, it offers the best solution to rational decision-making in economic planning. Indeed, it is virtually true to say that the optimal solution to a given problem within constraints can *only* be given by the programming approach. The methods of computation normally involve trial-and-error procedures, but the methods are so constructed that each trial yields values which are closer to the correct answer than the preceding values. We shall not here go into the computational methods. We are more concerned with the underlying principles.

The programming approach to development planning was initially used for the purpose of achieving balance between the supply of and demand for commodities and factors of production. As Chenery (1961) says, it can be considered, historically speaking, the operational counterpart of the theory of balanced growth. With the advent of mathematical programming techniques, however, it has also become possible to test the efficiency with which resources are used, and to reconcile the consistency of plans (i.e. balance) with efficiency (which means comparative advantage in an open economy). One particular programming technique which can assist in providing a simultaneous solution to the three main tasks of development planning is the technique of linear programming. The prefix 'linear' will become clear below. The purpose here is to describe the features of a simple linear programming problem, and to show how the solution to the problem of the optimum allocation of resources also implies a solution to the proper valuation of resources and efficiency in their use. In other words we shall show, given certain constraints, how a solution to the problem of resource valuation emerges as a simultaneous by-product of the solution to the problem of resource allocation and which commodities to produce. This property of linear programming is called the **duality** of price determination and allocation.

■ Linear Programming

Linear programming is a very versatile technique. Four important uses to which it can be put in the context of developing countries (or any country concerned with allocative efficiency) are as follows: first, it can be used for choosing between different techniques for making the same commodity; second, it can be used for deciding the best combination of outputs with given techniques and factor endowments; third, it can be used for deciding whether it is more efficient to produce commodities at home or buy them from abroad; and fourth, it can be used to determine the most efficient spatial location of activities. All the above-mentioned issues are optimising decisions of one form or another and can be incorporated into the standard form of a programming problem consisting of three parts: (1) the objective function to be maximised; (2) the constraints which must not be violated; and (3) the non-negativity conditions, e.g. that outputs or exports should not be negative.

Given this standard form of a programming problem, let us illustrate the principle of linear programming, and its important use for the valuation of resources, by taking the case of the choice of outputs X_1 and X_2 that can be produced with given techniques subject to constraints over the availability of resources Y_1 and Y_2.

Consider, then, the case of two commodities X_1 and X_2 whose price per unit is P_1 and P_2. The objective function to be maximised is $P_1 X_1 + P_2 X_2$, which will maximise national income. The problem is what combination of X_1 and X_2 to produce, subject to the non-negativity conditions, $X_1 \geqslant 0$, $X_2 \geqslant 0$, and the resource constraints. Suppose that there are two resources, capital and labour, and that no more than Y_1 labour is available and no more than Y_2 capital. Suppose further that commodity X_1 requires a_{11} labour and a_{21} capital, and commodity X_2 requires a_{12} labour and a_{22} capital, per unit of output. The objective function must therefore be maximised subject to the two constraints or inequalities:

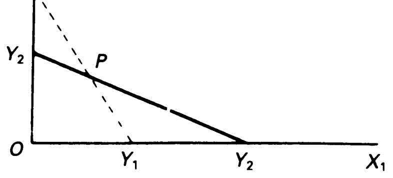
$$a_{11}X_1 + a_{12}X_2 \leqslant Y_1 \text{ (labour)}$$

$$a_{21}X_1 + a_{22}X_2 \leqslant Y_2 \text{ (capital)}$$

The problem is linear since in both the expressions to be maximised, and in the constraints, all the variables are multiplied by constants and added together. Commodity prices remain the same regardless of the level of output; similarly, the input coefficients remain constant, implying constant returns to scale.

Our programming problem can now be considered diagrammatically. In **Figure 12.1** the quantities of the two goods, X_1 and X_2, are measured

Figure 12.1



on the two axes and the resource constraints are represented by the straight lines Y_1 Y_1 and Y_2 Y_2.

Consider first the constraint or inequality $a_{11}X_1 + a_{21}X_2 \leqslant Y_1$, which is represented by the line Y_1 Y_1. This gives the maximum combination of the two commodities that can be produced given the amount of labour available. Any combination of X_1 and X_2 on the line, or within the area bounded by the line, is feasible. But now consider the second constraint or inequality $a_{21}X_1 + a_{22}X_2 \leqslant Y_2$, which is represented by the line Y_2 Y_2. The combination of the two goods X_1 and X_2 that can be produced must satisfy both inequalities, and thus only combinations on, or within, the boundary Y_2 PY_1 are now feasible. Outside this boundary one of the constraints would be violated. The area bounded by the line Y_2 PY_1 represents a kind of production-possibility curve and is called in linear programming 'the feasible region'. Any point within the feasible region, representing combinations of X_1 and X_2 which do not violate the capacity constraints, is called a 'feasible solution'.

It is clear that not every feasible solution will involve the full employment of resources. Any point within the area Y_2PY_1O will involve unemployment of *both* resources. Points on the line Y_2PY_1, but off *one* of the constraint lines, will involve underutilisation of *one* of the resources. Point P is the only combination of X_1 and X_2 that would fully employ both resources. Underutilised resources are called 'slack variables' and represent 'costless' resources. As we indicated at the outset, we are interested in the optimal value of these 'slack variables' since they will be indicative of shortages and surpluses. Let us label the slack variables S_1 and S_2, and now refer to the variables X_1 and X_2 as structural, or ordinary, variables. With the use of slack variables, the constraint equations become equalities and the programming problem becomes:

$$\begin{aligned} &\text{Maximise } P_1 X_1 + P_2 X_2 \\ &\text{subject to } a_{11}X_1 + a_{12}X_2 + S_1 = Y_1 \\ &\phantom{\text{subject to }} a_{21}X_1 + a_{22}X_2 + S_2 = Y_2 \end{aligned}$$

and the non-negativity conditions

$$X_1 \geqslant 0;\ X_2 \geqslant 0;\ S_1 \geqslant 0;\ S_2 \geqslant 0$$

As before, any values of the variables (X_1, X_2, S_1 and S_2) which satisfy both the constraints and the non-negativity conditions are said to represent a feasible solution. Any set of values of the variables in which the number of non-zero-valued variables (either ordinary or slack) is equal to the number of constraints is called a 'basic solution'. All basic solutions are feasible, and what we want to show is that in any linear programming problem an optimal solution can be found by considering only the basic solutions. As we shall come to see, this reduces the task of the allocation problem enormously.

In our example, an optimal solution is that which maximises the national income, i.e. the sum of the quantities of X_1 and X_2 each multiplied by their respective prices. The respective prices of X_1 and X_2 can be represented by parallel lines, as in **Figure 12.2**.

Given that prices are fixed and do not vary with output, it follows that the optimal point of a linear programme must always lie on the boundary of the feasible region since, if a commodity has a positive price, income can always be increased by expanding production to capacity until one or both capacity limits are reached. Given the feasible region Y_2PY_1 in **Figure 12.1**, there will always be at least one optimal solution which occurs at one of the corners Y_2, P or Y_1 of the feasible region. The optimal point will either be a tangency point, P, or, if the price lines are parallel to one of the segments of the feasible region, say PY_1, then the entire segment, including P and Y_1, will be optimal.

We can now show that all *basic* feasible solutions are represented by corners of the feasible

Figure 12.2

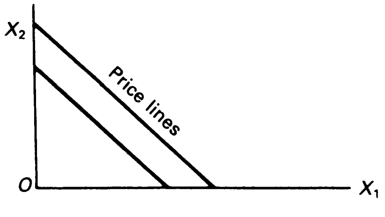
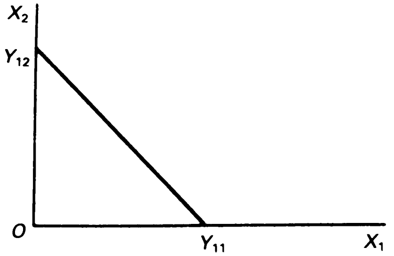


Figure 12.3



region. Take, for example, the labour constraint $Y_{12}Y_{11}$, as in **Figure 12.3**. At corner Y_{12}, $X_1 = 0$, S_1 (our slack variable) $= 0$, since all the resource is used, and $X_2 > 0$. At Y_{11}, $X_2 = 0$, $S_1 = 0$, and $X_1 > 0$. At O, $X_2 = 0$, $X_1 = 0$, and $S_1 > 0$.

Therefore, at all these corner points the number of non-zero values of the variables is equal to the number of constraints (i.e. one), and this is the condition for a basic solution. It can easily be seen that no other point represents a basic solution since, on the line, $X_1 > 0$, $X_2 > 0$ and $S_1 = 0$, and inside the line all variables are positive; that is, in all other cases the number of non-zero values of the variables will be greater than the number of constraints.

We conclude, therefore, that in any linear programming problem an optimal solution can be found by considering only the basic solutions. There will always exist an optimal solution in which the number of non-zero-valued variables (both ordinary and slack) is exactly equal to the number of constraints in the problem. The problem of resource allocation would seem to be greatly simplified by this conclusion, for the implication is that if an economy has only n constraints but $n + m$ activities to choose from ($m > 0$), national income can be maximised by cutting its range of activities to n (i.e. to the number of constraints). The logic of this implication is easy to understand. Take our previous example of one constraint. If there is linearity (i.e. constant returns to scale), it would pay to produce the commodity with the highest price up to capacity. It will only pay to introduce additional commodities if the number of constraints is increased. It is equally clear, however, that the validity of the conclusion reached hinges crucially on the assumption of linearity.

■ The Dual

The solution to a linear programming problem yields, in fact, two sets of solutions. One solution, which we have been considering up to now, is the 'best' combination of outputs, i.e. the values for X_1 and X_2 which maximise the national income given the prices of products. This is called the 'primal'. The second solution is known as the 'dual', or the prices of the resources that minimise the costs of producing a combination of outputs. The prices are those that would prevail if the investment pattern to maximise national income was undertaken. Let us first write out the dual of the maximising problem (the primal), and then outline the symmetry between the maximising and minimising problems, followed by an economic interpretation of the dual. We may write the dual of our maximising problem as follows:

Primal

$$\begin{aligned} &\text{Maximise } P_1 X_1 + P_2 X_2 \\ &\text{subject to } a_{11} X_1 + a_{12} X_2 \leqslant Y_1 \\ &\qquad\qquad a_{21} X_1 + a_{22} X_2 \leqslant Y_2 \end{aligned}$$

and non-negativity conditions $X_1 \geqslant 0$; $X_2 \geqslant 0$.

Dual

$$\begin{aligned} &\text{Minimise } r_1 Y_1 + r_2 Y_2 \\ &\text{subject to } a_{11} r_1 + a_{21} r_2 \geqslant P_1 \\ &\qquad\qquad a_{12} r_1 + a_{22} r_2 \geqslant P_2 \end{aligned}$$

and non-negativity conditions $r_1 \geqslant 0$; $r_2 \geqslant 0$.

where r_1 and r_2 are the shadow (or accounting) prices of the factors Y_1 and Y_2. The requirement is that the cost of producing commodities X_1 and X_2 should not be less than the price because this would violate the condition of maximising income, i.e. additional income could be generated by producing more.

In the dual, the inequality signs in the constraints are the reverse of the signs in the primal. If slack variables are introduced, their sign remains positive in the primal, but in the dual they must be subtracted from the left-hand side of the constraint equations. Let us label the slack variables in the dual as Z_1 and Z_2. The constraints now become equalities and the primal and dual may be written as:

$$\begin{aligned} &\textit{Maximise } P_1 X_1 + P_2 X_2 \\ &\text{subject to } a_{11} X_1 + a_{12} X_2 + S_1 = Y_1 \\ &\qquad\qquad a_{21} X_1 + a_{22} X_2 + S_2 = Y_2 \end{aligned}$$

$$\begin{aligned} &\textit{Minimise } r_1 Y_1 + r_2 Y_2 \\ &\text{subject to } a_{11} r_1 + a_{21} r_2 - Z_1 = P_1 \\ &\qquad\qquad a_{21} r_1 + a_{22} r_2 - Z_2 = P_2 \end{aligned}$$

If we now put the primal and the dual in matrix form, the symmetry between the two problems becomes apparent immediately:

Primal matrix

$$\begin{array}{c|ccc|} & & X_1 & X_2 \\ \hline & & P_1 & P_2 \\ S_1 & Y_1 & a_{11} & a_{12} \\ S_2 & Y_2 & a_{21} & a_{22} \\ \hline \end{array}$$

Dual matrix

$$\begin{array}{c|ccc|} & & r_1 & r_2 \\ \hline & & Y_1 & Y_2 \\ Z_1 & P_1 & a_{11} & a_{21} \\ Z_2 & P_2 & a_{12} & a_{22} \\ \hline \end{array}$$

If we look at the primal and dual in equation and matrix form we observe the following: if the primal involves $\geqslant$ signs, the dual involves $\leqslant$ signs; the price constants, P_1 and P_2, in the primal, become constraints in the dual – replacing the capacity constraints Y_1 and Y_2; the coefficients in the constraint inequalities, a_{11}, a_{12}, which go from left to right in the primal, go from top to bottom in the dual. And, as far as the two matrices are concerned, the dual matrix is merely the primal matrix with the positions of the bottom left-hand corner and the top right-hand corner reversed.

Let us now give a numerical example of the primal and dual and use this example to give an economic interpretation of the dual:

$$\begin{aligned} &\textit{Maximise } 2X_1 + 6X_2 \\ &\text{subject to } 4X_1 + X_2 \leqslant 5 \\ &\qquad\qquad 3X_1 + 2X_2 \leqslant 7 \end{aligned}$$

$$\begin{aligned} &\textit{Minimise } 5r_1 + 7r_2 \\ &\text{subject to } 4r_1 + 3r_2 \geqslant 2 \\ &\qquad\qquad r_1 + 2r_2 \geqslant 6 \end{aligned}$$

To produce one unit of commodity X_1 the total value of inputs is $4r_1 + 3r_2$. This may exceed or equal, but not be less than, 2, which is the price per unit of output X_1. The inequality sign tells us that we must assign values to each of the inputs sufficient to account for the price of the commodity in question. An analogy with a business enterprise will be useful here. A firm must choose values for its scarce inputs (Y_1 and Y_2) that will account for all its profits. Values of r_1 and r_2 must be chosen so that the net profit from production is accounted for. If the accounting values are such that profits are not completely imputed to the factors, then the accounting values must be raised until the unimputed profit has been eliminated. Thus the variables r_1 and r_2 in the dual problem can be interpreted as the required accounting values of the scarce inputs. If, of course, factors are not scarce, their accounting values must be zero because if their supply increased profits could not be increased because of other constraints, and if their supply was reduced profits would not fall because output would not be affected. Thus the aim of the dual is to minimise the total cost of providing the inputs in question. At the minimum the total cost of providing the inputs will be exactly equal to the total profit derived from their use. If an input is in excess supply, an additional unit will add nothing to profit and therefore its opportunity cost is zero.

The valuation of the factor inputs affects the optimum combination of outputs through the slack variables, Z_1 and Z_2, in the dual.

We previously wrote the dual equation for product X_1 as:

$$a_{11}r_1 + a_{21}r_2 - Z_1 = P_1$$

This can be written:

$$Z_1 = a_{11}r_1 + a_{21}r_2 - P_1$$

If $a_{11}r_1 + a_{21}r_2$ represents the value of resources going into X_1, and Z_1 is positive, this implies that the resources used in producing X_1 are worth more than the commodity and thus production of X_1 would involve a *relative loss* to society. The valuation of factors, therefore, affects the opportunity cost of producing products. Products with non-zero slack variables should not be produced. If, however, resources were valued such that there was no difference between the total value of resources and the price of the commodity, then Z_1 would be zero and it would be 'profitable' to produce X_1. (In a nutshell, this is why valuing surplus labour at zero would lead to the production of commodities using labour-intensive techniques.)

We are now in a position to state an important duality theorem. An optimal solution to the allocation and valuation problems requires that:

$$X_j Z_j = 0 \text{ for each commodity } j$$

and

$$r_i S_i = 0 \text{ for each input } i$$

$X_1 Z_1 = 0$ requires either that $X_1 = 0$ or that $Z_1 = 0$ (or both). If the output of X_1 is positive, then we must have $Z_1 = 0$ (i.e. its accounting loss must be zero with all profits imputed to the scarce factors). If $Z_1 > 0$, then we must have $X_1 = 0$ (i.e. X_1 must not be produced). The logic of not producing commodities with a non-zero accounting loss is simply that the inputs used in producing the good would be more valuable elsewhere. The accounting losses may be thought of as opportunity costs. Thus if two commodities required the same amount of scarce inputs, it would pay to produce the commodity with the least opportunity cost.

The interpretation of the other equation is similar. $r_i S_i = 0$ requires that either $r_i = 0$ or $S_i = 0$ (or both). If $S_i > 0$ (i.e. there are surplus inputs), then we must have $r_i = 0$ (i.e. the input must be given a zero accounting price). The logic of valuing surplus inputs at zero is simply that if an extra unit of the input was forthcoming, it would add nothing to profit because it is already in surplus; similarly, if a unit were taken away it would not subtract from profit.

When all profits have been eliminated, there will be a unique set of factor prices corresponding to each factor's marginal contribution to output (as under perfect competition) and to the combination of outputs. In the language of programming, these derived or shadow prices are the Lagrange multipliers of a constrained optimisation problem. They correspond with the marginal products of factors of production in an optimal situation when all alternative uses have been taken into account. That combination of products which maximises income and minimises costs by obtaining the shadow prices of factors is called 'efficient'. The properties of the set of prices associated with the point of efficiency are:

1 that no activity has a positive profitability;
2 that every activity carried out has zero profitability; and
3 that the prices of all factors which are not exhausted are zero.

Linear programming highlights the importance of using shadow prices for factors in achieving 'efficient' resource allocation. The results are identical with those that would prevail under perfect competition, given the same technological assumptions. The shadow prices themselves may therefore be considered 'efficiency' prices since they lead to the most efficient allocation of resources.

Two main drawbacks of linear programming may be cited. First, the programming problem may not be linear, in which case other techniques must be resorted to. Second, it is a weakness of linear programming that product prices are assumed to reflect society's marginal valuation of them. On the one hand there is the problem of imperfect product markets with prices in excess of marginal cost. The other related, but more serious, problem is that the relative prices of capital and consumption goods may undervalue the importance that a society attaches to growth. If so, either shadow prices must be derived for products, or some allowance must be made in valuing the factors of production in recognition of the growth objective. The latter solution in the case of labour was considered in Chapter 8, where a more general formulation is presented of the valuation of labour in surplus-labour economies in which emphasis is on growth as well as efficiency.

Part V
Financing Economic Development

■ Chapter 13 ■

Financing Development from Domestic Resources[1]

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■ Introduction

Real capital formation from domestic resources requires investment and a commensurate increase in the volume of real saving. In the absence of international trade and foreign borrowing, capital formation is only possible through abstinence from present consumption and when society produces a surplus of consumer goods sufficient to meet the needs of labour engaged in producing capital. In a subsistence (Robinson Crusoe) economy, saving and investment are simultaneous acts, in the sense that if a producer is to develop the means of production he must sacrifice time and resources which would otherwise be used for consumption purposes. In a money exchange economy, savings and investment may be undertaken by different groups, and the process of capital formation is likely to require some form of finance and credit mechanism to 'redistribute' resources from savers to investors. In fact, in the early stages of development savings may not be the major barrier to capital formation but rather the unwillingness or inability to invest. The unwillingness to invest may stem from cultural attitudes or simply from a realistic assessment of the risks involved. The inability to invest, on the other hand, may result from shortages of factors of production and supplies necessary for particular types of capital formation that would be profitable. In short, in the transition from the subsistence to the money economy, the main obstacle to capital formation may not be a shortage of saving but bottlenecks in the productive system which do not permit investment or make it too risky. One of the ways of overcoming these bottlenecks is through international trade and foreign borrowing.

For the moment, however, let us take for granted that the willingness and ability to invest exists, and consider the supply of domestic savings to developing countries. In this respect we must not only consider the sectors from which saving originates but also how savings may be stimulated, especially through the deliberate policy actions of government. This will involve a brief consideration of fiscal and monetary policy in developing countries, including the role of inflationary finance in providing real resources for capital formation.

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[1] The 1989 *World Development Report* published by the World Bank was devoted to the topic of Financial Systems and Development.

As far as domestic saving is concerned, three broad 'types' may be distinguished: voluntary; involuntary; and savings generated through policies to increase output in situations of unemployed or underemployed resources. The origin of these 'types' of saving should be fairly self-explanatory. **Voluntary savings** are savings that arise through voluntary reductions in consumption out of disposable income. Both the household and the business sectors may be a source of voluntary savings. By contrast, **involuntary savings** (or what is euphemistically called 'collective thrift') are savings brought about through involuntary reductions in consumption. All forms of taxation, and schemes for compulsory lending to governments, are traditional measures involving involuntary reductions in consumption. In addition, consumption may be reduced by the process of inflation (i.e. rising prices), and this is often referred to as **'forced' savings.**[1] For a variety of reasons, which will be considered later, inflation is likely to be a natural concomitant of development, but it can also be deliberately induced or exacerbated by policy measures such as monetary expansion and deficit finance at full employment. Third, deficit finance at less than full employment can generate saving by activating unemployed or underemployed resources. An increase in the volume of real saving can always be brought about by increases in real output, provided the propensity to consume out of extra income generated is less than unity.

Domestic savings for investment can also be supplemented from abroad. Private foreign investment is a direct source of capital formation and provides a direct addition to domestic investment. It can also be a source of savings by stimulating income and employing previously underutilised resources. Second, borrowing from abroad provides resources for investment by enabling imports to exceed exports, which in the national accounts shows up as investment in excess of domestic saving. Foreign assistance may be from multilateral or bilateral sources, and may take a variety of forms ranging from loans at commercial rates of interest to outright gifts of goods and services and technical assistance. Last, a country's commercial policy can stimulate savings and release resources for investment purposes. Trade itself, and an improvement in a country's terms of trade, can provide additional resources for investment if the increase in real income made possible is not fully consumed. Likewise, policies to restrict imports of consumption goods can release additional resources for investment, provided that domestic saving is not reduced by the purchasing power released being switched to home consumption goods. These topics are taken up in subsequent chapters.

There are three main analytic approaches to the study of the finance of development from domestic resources. First, there is the **prior-savings approach** which stresses the importance of prior savings for investment and the need for policies to raise the level of savings either voluntarily, or involuntarily, or both. The approach is very classical in conception, emphasising saving as a prerequisite of investment. The approach is also characterised by a strong aversion to inflation and a belief that saving will readily find investment outlets.

Second, there is the **Keynesian approach** to the finance of development which rejects the idea that saving determines investment and argues instead that the encouragement of investment will generate its own saving, either through increases in output if resources are unemployed, or through income redistribution from groups with a low propensity to save to groups with a high propensity to save as a result of inflation if resources are fully employed.

Third, there is the so-called **Quantity Theory approach** to the finance of development which points to the role of government monetary expansion in appropriating resources for development.

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[1] Some inflation-induced saving may be voluntary, some involuntary.

If developing countries are characterised as fully employed in the Keynesian sense (with no spare capacity in the consumption-goods industries), both the Keynesian and Quantity Theory approaches to the finance of development will involve inflation. Plans to invest in excess of plans to save at full employment will drive the price level up, and so will monetary expansion by government. In this sense there is an important practical, as well as a theoretical, difference between the prior-savings approach and the other two approaches. In the prior-savings approach the resources released for investment come from voluntary and involuntary saving and no inflation is involved. In the Keynesian and Quantity Theory approaches the resources are released through the process of inflation, by income redistribution from classes with low propensities to save to those with higher propensities to save, and by inflation as a 'tax' on money.

■ The Prior-Savings Approach

In classical theory saving and investment are one and the same thing. All saving finds investment outlets through variations in the rate of interest. Investment and the development process are led by savings. It is this classical view of the development process which underlies such phrases in the development literature as the 'mobilisation of savings for development' and which also underlies the policy recommendation of high interest rates to encourage voluntary saving. Lewis's influential model of the development process, which we considered in Chapter 3, is a classical model stressing the importance for development of the reinvestment of the capitalist surplus.

The level of saving, and the ratio of saving to national income, in developing countries is likely to be a function of many variables affecting the ability and willingness to save. The main determinants of the ability to save will be the average level of *per capita* income, the rate of growth of income and the distribution of income between rich and poor. The willingness to save, in turn, will depend on such monetary factors as the existence of acceptable and reliable monetary institutions, the interest rate offered in relation to risk and time preference, and general societal attitudes to consumption and the accumulation of wealth. Differences in the willingness to save between countries may distort the estimation of saving functions across countries based on economic variables alone.[1]

Having said this, however, the time-series and cross-section evidence is that the level of savings per head and the savings ratio is primarily a function of the level of *per capita* income, and to a lesser extent a function of the rate of growth of income and the distribution of income between wages and profits. Economic theory predicts this. The hypothesis that savings per head, and the savings ratio, is a function of income per head is part of the Keynesian absolute-income hypothesis that saving is a function of income. If we write the Keynesian savings function as $S = -a_0 + b_0 (Y)$ and divide through by the population level (N) we have:

$$S/N = -a_1 + b_1 (Y/N) \qquad (13.1)$$

Now to obtain an expression for the savings ratio, multiply equation (13.1) by N and divide through by Y:

$$S/Y = b_1 - a_1 (Y/N)^{-1} \qquad (13.1)$$

The Keynesian absolute-income hypothesis therefore predicts that savings per head (S/N) is a linear (but non-proportional) function of income per head (Y/N), and that the savings ratio (S/Y) is a hyperbolic function of the level of income per head; that is, that the savings ratio will rise with the level of *per capita* income but at a decreasing rate. As $Y/N \rightarrow \infty$, $S/Y \rightarrow$ to the asymptote b_1.

A number of studies have fitted equation (13.1) to cross-section data for different samples of countries and found a significant non-proportional relation. Leff (1969) has fitted the function to data in logarithmic form for samples of developed and developing economies and finds that the elasticity of savings *per capita* with respect to income *per capita* exceeds unity in both cases. Williamson (1968), using pooled time-series data for a sample of Asian countries, finds the intercept term in equation (13.1) significantly negative, indicating that the average propensity to save rises with the level of *per capita* income. Houthakker (1965) has taken consumption per head instead of savings per head and regressed the logarithm of domestic consumption *per capita* on the logarithm of income *per capita* for thirty-four countries and finds an elasticity of less than unity, indicating that the consumption ratio falls and the savings ratio rises with increases in the level of *per capita* income. Other studies, such as that by Chenery and Eckstein (1970) for 16 Latin American countries, support the Keynesian savings function, but find very little difference between the average and marginal propensity to save, indicating very little increase in the savings ratio as income rises.

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[1] For a survey of savings behaviour in developing countries, see Mikesell and Zinser (1973).

When equation (13.2) is fitted directly to cross-section data the positive dependence of the savings ratio on *per capita* income is also very apparent. The savings ratio rises with the level of *per capita* income and then levels off. Singh (1972) in a major cross-section study taking 70 countries over the period 1960–65, found that the gross savings ratio rose 8 percentage points as *per capita* income rose from $100 to $1000 per annum (at prices then prevailing). But he concluded that with *per capita* income growing at 2 per cent per annum it would take 50 years for the savings ratio to rise by 3 percentage points. The average gross domestic savings ratio by continent is now approximately as follows: sub-Saharan Africa (12 per cent); East Asia (31 per cent); South Asia (19 per cent); Europe, Middle East and North Africa (28 per cent); and Latin America and Caribbean (21 per cent) (*World Development Report*, 1989).

The reasons why the savings ratio should rise as *per capita* income increases and then level off are not clear cut. It is as if saving is a luxury good in the early stages of development which then loses its appeal. Part of the reason may be purely 'statistical' arising from the way saving is normally defined in developing countries as the difference between investment and foreign capital inflows. As investment expenditure becomes more faithfully and accurately recorded as development proceeds (as *per capita* income rises) the savings ratio is also shown to increase. But there are also a number of economic factors that no doubt play a contributory role in explaining the relation. One is the growth of the money economy. As money replaces barter for transactions, the public will wish to hold a higher proportion of their income in the form of money which they can only do by giving up command over real resources. This hypothesis is supported by what we know about the income elasticity of demand for money in developing countries, which exceeds unity. (For evidence, see Thirlwall (1974) ch. 5.) A second possible explanation is that population growth decreases with increases in the level of *per capita* income so that population growth absorbs household saving to a lesser and lesser extent. Another plausible hypothesis is that in the early stages of development the distribution of income, both personal and functional, grows more unequal but at a decreasing rate. If higher-income groups have higher propensities to save than lower-income groups, and profit-earners have a higher propensity to save than wage-earners, the savings ratio will be positively related to the degree of inequality in the income distribution (the personal income distribution) and to the share of profits in total income (the functional income distribution). Some evidence of the widening distribution of income in the early stages of development was given in Chapter 1. The hypothesis that the savings ratio in developing countries is functionally related to the distribution of income has been tested by Houthakker (1965) with respect to the functional distribution of income, and he concludes that the distribution of income between wages and profits is a significant determinant of the overall savings ratio.

It will be remembered from Chapter 3 that in Lewis's model of development with unlimited supplies of labour it is not the absolute level of *per capita* income that is the prime determinant of the savings ratio but the size of the capitalist surplus and the distribution of income between entrepreneurial profits and other income. Lewis says, 'if we ask why the less developed countries save so little the answer is not because they are so poor but because their capitalist sector is so small'. Lewis also expressed the view that no nation is so poor that it could not save and invest at least 12 per cent of its national income if it so wished. Investment as a proportion of national income is not small because of an incapacity to save but because the surplus generated in developing countries is used to maintain 'unproductive hoards of retainers' and for conspicuous consumption in general. Lewis's view is very much in line with our earlier remark that in the early stage of development there may be no savings–investment gap in the sense of an incapacity to save, but an unwillingness to save or to use saving for productive capital formation.

Studies by Modigliani (1970) and others also show that the savings ratio is positively related to the rate of growth of income. All this evidence suggests that development and rising living standards is a cumulative phenomenon. Growth depends on saving and capital formation, but saving in turn depends on growth and the level of *per capita* income. A virtuous circle can be started once the growth of income rises above the growth of population, allowing *per capita* income to rise. The virtuous circle of growth must be initiated by raising directly the desperately low levels of *per capita* income of the vast majority of people by making their labour more productive. This is the first task of financing capital formation by domestic voluntary means within the prior-savings approach. The second task is to encourage and exhort those with the ability to save to curtail extravagant consumption and to invest productively the surplus of income over whatever level of consumption is decided upon. The encouragement to save and invest productively must come from the government or some organ of government such as the planning agency. This is where monetary and fiscal policies become important. At the practical level this is exactly what the prior-savings approach to development is concerned with – designing monetary and fiscal policies which raise the level of savings directly, and also indirectly, by allocating capital in the most productive way possible.

■ Monetary Policy[1]

Monetary policy to encourage saving largely takes the form of the development of **financial intermediaries**, which can encourage those with a productive surplus to save by taking the risk out of savers lending directly to investors, and the development of **branch banking** which can tap small savings. Because of the law of large numbers, financial intermediaries are also able to borrow short and lend long, which is advantageous to lenders (by giving them liquidity) and borrowers alike. Monetary policy to encourage saving may also attempt to encroach on the **unorganised money market**, which lends mainly for consumption purposes. Paradoxically (on a classical view of the world) the development of the organised money market can both *lower* average interest rates in the economy at large and *raise* the level of saving because the unorganised money market charges very high interest rates and lends mainly for consumption purposes, whereas in the organised money market interest rates are lower and lending is more for investment purposes.

A well-developed financial system, and especially financial intermediation, is also important for the efficient allocation of capital between competing uses and to ensure that saving is used for investment purposes. In the early stages of development most saving is done by the household sector of the economy, which invests less than it saves. In the absence of financial assets, saving typically takes the form of the acquisition of physical assets, including animals, land, jewellery, and the like. The purchase of such assets, provided they are 'second hand', frees resources for investment, but there is no guarantee that the seller of the assets will use the sale proceeds for investment purposes. The proceeds may be consumed; alternatively, investment may take place in relatively unprofitable activities because there is no mechanism for the distribution of new capital beyond the sectors in which it is generated. The existence of monetary assets and financial intermediaries provides a surer guarantee that the act of saving will lead to investment and that the return on the investment will be maximised.

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[1] For more detailed expositions of the role of monetary policy and institutions, see Drake (1980); Ghatak (1981), and Eshag (1983).

It is also particularly important that the capital market should be integrated, in the sense that the interest-rate structure is unified. The consequence of a fragmented capital market in which interest rates vary from one sector to another because of a lack of information and factor immobility is that some sectors of the economy may be able to borrow funds far below the rate of interest prevailing in other sectors where the productivity of capital is higher. The allocation of capital is distorted and inefficient and the capital–output ratio is higher than it would otherwise be. The solution is to encourage funds into the organised money market, and to extend the provision of financial institutions into sectors of the economy which lack them.

A well-developed financial system has four main requisites, each of which can contribute to the process of financial deepening and to raising the level of saving. These four requisites comprise: the monetisation of the economy and the replacement of barter as a means of exchange; the establishment of a central bank; the development of a commercial banking system; and the development of a well-co-ordinated capital market.

The monetisation of an economy possesses the potential for generating a real investible surplus in several ways. As fiat money replaces barter in transactions, the demand for money relative to income rises, which releases real resources of equivalent value. The increase in real saving is equal to the increase in the real stock of money held. The issuer of money can appropriate the released resources and increase the level of investment accordingly. In a growing economy monetary expansion is also required to allow an increased volume of transactions to take place. Monetary expansion for this purpose, too, can be appropriated by governments for development purposes. The increased use of money not only releases resources, but it also saves and generates resources. It saves resources by replacing barter objects, or commodity money which may be costly to produce, with money which is virtually costless to produce. It also saves time, which is a resource if the marginal product of labour time is positive, by avoiding the double coincidence of wants necessitated by barter. Money generates resources by facilitating exchange and thereby permitting the greater division of labour and specialisation.

Historically, the growth of the money economy has also been a powerful stimulus to the development of banking and credit mechanisms which themselves can act as a stimulus to saving and investment. When the range of financial assets is narrow, saving tends to take the form of the acquisition of physical assets. While in principle this should not mean that the level of saving is reduced below what it might otherwise be, in practice it depends on how sellers of physical assets dispose of the sale proceeds. If a portion of the proceeds is consumed, the saving of one person is offset by the dissaving of another, and less resources are released for investment than if financial assets had been acquired, issued by financial institutions with an investment function. This is a major reason why the statistics on saving and investment in developing countries understate the saving and investment capacity of these countries.

The Theory of Financial Liberalisation

Many developing countries are characterised by **financial repression**, which may be defined as a situation in which government and Central Bank regulations distort the operation of financial markets. These regulations include: ceilings on the nominal rate of interest (making the real rate of interest very low or negative in times of inflation); the imposition of reserve requirements on the commercial banks, limiting their ability to lend; the requirement that banks lend to the government to finance budget deficits, and compulsory credit ceilings. The consequence of these restrictions, so the argument goes, is to reduce the flow of funds to the formal financial sector and to distort the most productive allocation of resources, leading to lower levels of saving, investment and growth than otherwise would be the case.

The importance of the growth of the money economy and financial deepening for economic development on the lines indicated above has been stressed in the development literature for a long time,[1] but it was McKinnon (1973) and Shaw (1973) independently in that year, who first highlighted the dangers of financial repression in a rigorous way, and argued the case for **financial liberalisation.** Their arguments differ, however. **McKinnon's argument** is that money holdings and capital accumulation are complementary in the development process. Because of the lumpiness of investment expenditure and the reliance on self-finance, agents need to accumulate money balances before investment takes place. Positive (and high) real interest rates are necessary to encourage agents to accumulate money balances, and investment will take place as long as the real interest rate does not exceed the real rate of return on investment. **Shaw's argument**, on the other hand, stresses the importance of financial liberalisation for financial deepening, and the effect of high interest rates on the encouragement to save and the discouragement to investment in low-yielding projects. The increased liabilities of the banking system, resulting from higher real interest rates, enable the banking system to lend more resources for productive investment in a more efficient way.

The financial liberalisation school, however, is not without its critics. Firstly, financial saving is only one type of saving. As interest rates are raised there may simply be a substitution between financial assets and other assets leaving total saving unchanged. Also, it is well known that any price change has income effects as well as substitution effects, and if the one offsets the other, the effect on total saving will be negligible. This being so, it is perhaps surprising, as Dornbusch and Reynoso (1989) have remarked, 'to find so strong a belief in the ability of higher interest rates to mobilise saving'. In fact, many of the recent empirical studies and surveys of the results of financial liberalisation in various countries are extremely cautious in their conclusions. Research by Gupta (1987) on 22 Asian and Latin American countries over the period 1967–76 suggests that there is little support for the 'repressionist' hypothesis that the positive substitution effect of real interest rates on savings dominates the negative income effect. The most important determinant of saving is real income. Giovannini (1983) concludes from his research on eight Asian countries that his results 'cast serious doubts on the view that the interest elasticity of savings is significantly positive and easy to detect in developing countries'. Similarly, a study by two World Bank economists (Cho and Khatkhate (1990)) of the financial liberalisation experience of five Asian countries concludes that

> financial reform, whether comprehensive and sweeping or measured and gradual, does not seem to have made any significant difference to the saving and investment activities in the liberalised countries. It was believed until recently that removal of the repressive policies would boost saving. The survey in this paper of the consequences of reform does not reveal any systematic trend or pattern in regard to saving . . . it lends support to the conclusion that decisions to save are determined by several factors and the relationship between savings and real interest rates is at best ambiguous.

If financial liberalisation does not increase aggregate saving, its positive impact on development must come through a more efficient allocation of society's real resources which raises the productivity of investment, but there is no firm evidence of this.

A second weakness of the financial liberalisation school is that it is implicitly assumed that the supply of loans is dependent on the volume of deposits held by the banks. In other words, it treats the supply of credit as exogenous. Banks, however, have the power to create credit; they can expand their loans despite their reserves and their deposits by borrowing from the Central Bank. In a credit money system, the supply of credit is endogenous. Within this framework, what is important is not incentives for saving, but incentives for investment. This being so, high interest rates may actually discourage total saving by discouraging investment. This is the **Keynesian or Post-Keynesian** riposte to the financial liberalisation school. The work of Davidson (1986) and Asimakopulos (1986) is representative of this line of thinking. Davidson argues that all that is needed to initiate additional real investment is finance provided by an increase in total bank loans with no need for increased saving 'as long as the banks can create new finance via acceptable bank accounting practices'. In the same vein, Asimakopoulos remarks 'the investment market can become congested through a shortage of cash. It can never become congested through a shortage of saving.' If banks can create credit without having to increase their deposits, an increase in financial saving may make no difference to the amount of total credit given to the private sector. The total amount of credit is determined not by the supply of loans but by demand, i.e. by the decision to invest. How the supply of credit responds to the interest rate, and how investment is affected by the supply of credit and the rate of interest becomes very much an empirical matter which can only be settled by an appeal to the facts. In work on Mexico by Warman and the present author (Warman and Thirlwall (1994)), we find that financial saving does respond positively to the rate of interest, and this also leads to an increase in the supply of credit from the banking system to the private sector. However, while the increased supply of credit affects investment positively, there is a strong negative effect of interest rates on the level of investment, holding the supply of credit constant, and the *net* effect of higher real interest rates on investment is adverse.

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[1] See, for example, Gurley and Shaw (1960) and Tun Wai (1972).

A third worry about the financial liberalisation argument concerns the relationship between the formal money market and the informal money market, or **curb market**, which is unregulated. If more funds become allocated to financial institutions as interest rates rise, the total supply of loans may be reduced because financial institutions are subject to reserve requirements, which the curb market is not. For financial liberalisation to succeed, demand deposits must be much better substitutes with currency and foreign bonds than with curb loans. This again is an empirical matter, but very difficult to test directly without information on the supply of credit from the curb market. To the extent, however, that curb loans are for consumption purposes, and the government uses the reserve requirements of the banks for productive investment, the reallocation of funds between markets may not unduly affect the total level of saving and investment from the supply side.

The Development of the Banking System

The development of a national banking system, comprising a central bank, a commercial banking system and special development banks, is one of the first priorities of development planning. The functions of **a central bank** include the following: the issue of currency and lending to government which can transfer real resources to government in the manner described earlier (with a strong central bank it is very much easier to give priority to the needs of the government and the public sector); the development of a fractional reserve banking system through which it can provide liquidity and control credit (a central bank can require member banks to hold reserves in government bonds, and the growth of the bond market itself can aid development without excessive monetary expansion); the development of other financial institutions, especially institutions to provide long-term loan finance for development and to provide a market for government securities; the maintenance of a high level of demand to achieve capacity growth; and the application of selective credit controls if necessary in the interests of developing particular sectors of the economy. The stabilisation role of the central bank is essentially secondary to its development role. Stabilisation is particularly difficult in a developing country where credit control, the main instrument of stabilisation policy, is ill-developed, and where the major causes of fluctuations in income tend to be the variability of export receipts and the volatility of overseas investment.

The **commercial banking system** has two important functions: one to create credit; the other to encourage thrift and to allocate saving in the most socially productive manner. The ability of an economic system to create credit is important for two main reasons. First, it can compensate for the failure of the economic system to equalise planned saving and investment. Second, it provides the means by which growth is financed. This is the real significance of the invention of paper money and credit – permitting the economic system to expand in response to the continual opportunities for growth provided by technical progress, which a barter system, or a purely metallic currency, does not allow.

Banks can encourage thrift and allocate savings more productively than otherwise by offering a return on savings and by enabling savings to be used outside the sector in which they originate. Banks can help to break down sectoral bottlenecks and to unify interest rates. But commercial banking is still rudimentary in most developing economies. The ratio of bank deposits to national income averages approximately 15 per cent and the proportion of demand deposits to the total money supply averages between 25 and 30 per cent. In developed countries, by contrast, the ratio of bank deposits to national income usually exceeds 30 per cent and the money supply consists largely of the deposits of the commercial banks. The number of banks relative to population size is also small. In the developing countries as a whole, the average number of banks per million of the population is about ten compared with 180 in developed countries. Banks need to be numerous and dispersed if they are to act as catalysts for small savings. Lewis comments that experience shows that the volume of saving partly depends on how widespread savings institutions are: 'if they are pushed under the individual's nose people save more than if the nearest savings institution is some distance away' (Lewis (1955)). One of the purposes of the extensive bank nationalisation in India in 1969 was to expand branch banking and to foster the role of banks in promoting development in previously neglected regions and sectors of the economy, in particular in small businesses in rural areas. Between 1969 and 1972 over 3000 new branch bank offices were set up throughout India by the fourteen newly nationalised banks. The story is told that the opening of four branch banks in villages near New Delhi attracted two million rupees in one day, including a 200 000 rupee hoard from a local temple.

Special development banks also have a role to play in financing development. They have several purposes: to provide finance for industry, especially where there is difficulty in raising finance through existing financial channels, to assist the development of the capital market, and to stimulate leading sectors of the economy. The emphasis of special development banks differs between countries. Some invest directly, others guarantee loans floated by private industry. In general, however, the emphasis is on long-term finance, and on assistance to specific sectors of the economy where the risks of investment may be higher than the ordinary commercial banking system is willing to accept. Development banks also have a role to play in stimulating the capital market. This they can do by selling their own stocks and bonds, by helping enterprises float or place their securities, and by selling from their own portfolio of investments.

The importance of developing and integrating the capital market cannot be overstressed, both from the point of view of encouraging saving and from the point of view of the most productive use of saving. One of the objects of the extension of the money economy must be to reduce fragmentation of the capital market, and in particular to reduce the dominance of the unorganised money market, where interest rates are very high. Since the unorganised market largely embraces the rural areas and agriculture, a fragmented market means high interest rates for agriculture and low interest rates for industry where the returns to investment may be lower. Furthermore, within the rural areas themselves, the limited outlets for saving can lead to the wasteful use of resources. In the absence of outlets for saving other than hoarding or investment within the sector, peasants with cash surpluses may be forced into hasty decision-making, leading to overinvestment and wasteful investment in some sectors and underinvestment in others.

Monetary policies which are non-inflationary are essentially designed to raise the level of saving and investment voluntarily. Monetary policies can also 'force' saving, as we shall see later when the Quantity Theory approach to the finance of development is discussed. Before, this, however, there is another arm of the prior-savings approach that needs considering, namely the use of fiscal policy to raise the level of saving. Saving raised by fiscal policy is essentially involuntary saving except to the extent that the fiscal policy pursued encourages increased production which generates its own saving if the marginal propensity to save is positive.

■ Fiscal Policy

Fiscal policy has two major roles in the finance of development. One is to maintain an economy at full employment so that the savings capacity of the economy is not impaired. The second is to raise the marginal propensity to save of the community as far above the average propensity as possible without discouraging work effort or violating canons of equity. Using fiscal policy to maintain full employment will involve deficit finance if there exists unemployed or underused real resources in the Keynesian sense. While deficit finance is likely to be inflationary in the short run until supply has had time to adjust, there is an important analytical distinction between the means by which resources are made available for investment through deficit finance at less than full employment and the means by which savings are generated by inflation. In the former case savings are generated by the increase in real output, in the latter case by a reduction in real consumption through a combination of factors including a real balance effect on outside money,[1] income redistribution from low savers to high savers, and money illusion.

Fiscal policy to raise the marginal propensity to save above the average is concerned with the design and implementation of taxes to reduce private consumption. Tax revenue as a percentage of national income and the relative importance of different taxes are shown in **Table 13.1.** It can be seen that tax revenue as a percentage of GNP is typically low in developing countries, averaging about 20 per cent, compared to over 30 per cent in developed countries, and that taxes on income are a minor source of tax revenue compared with indirect taxes. The proportion of the population that pays income tax in developing countries is correspondingly low, averaging about 10 per cent, compared to the vast majority of the working population in developed countries which constitutes between 30 and 40 per cent of the total population. On the surface there would appear to be a great deal of scope for using tax policy to raise the level of community saving relative to income. Two important points must be borne in mind, however. The first is that the rudimentary nature of the tax system in developing countries is partly a reflection of the stage of development itself. Thus the scope for increasing tax revenue as a proportion of income may in practice be severely circumscribed. There are the difficulties of defining and measuring the tax base and of assessing and collecting taxes in circumstances where the population is dispersed and primarily engaged in producing for subsistence, and where illiteracy is also rife. And there is also the fact that, as far as income tax is concerned, the income of the vast majority of economic agents is so low anyway that they must fall outside the scope of the tax system. Whereas 70 per cent of national income is subject to income tax in developed countries, only about 30 per cent is subject in developing countries.

Even if there was scope for raising considerably more revenue by means of taxation, whether the *total* level of saving would be raised depends on how tax payments are financed – whether out of consumption or saving – and how income (output) is affected. It is often the case that taxes which would make tax revenue highly elastic with respect to income are taxes which would be met

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[1] The real balance effect on outside money refers to the attempt by holders of money assets to restore the real value of their money balances, eroded by inflation, by reducing their consumption. For a fuller discussion, see below.

Table 13.1 *Developing Countries: Tax Revenue by Type of Tax (per cent of GDP)*

	GDP per capita (1987 dollars)	*Years*		*Total taxes*	*Income tax*	*Indirect taxes*	*Trade taxes*
Kuwait	14 870	1985	1987	1.91	0.49	0.27	1.11
Bahamas	10 320	1984	1986	16.80	0.00	2.02	13.33
Netherlands Antilles	9 400	1984	1986	5.59	0.00	2.42	2.84
Bahrain	8 530	1985	1987	6.03	1.59	1.23	2.96
Singapore	7 940	1984	1986	16.07	7.25	3.85	1.05
Israel	6 810	1984	1986	33.35	16.34	13.06	2.10
Oman	5 780	1984	1986	10.45	8.72	0.32	1.18
Barbados	5 330	1983	1985	24.95	9.97	7.20	4.78
Cyprus	5 210	1986	1987	13.84	5.29	4.74	4.53
Greece	4 350	1983	1985	20.19	6.38	12.73	0.34
Trinidad and Tobago	4 220	1979	1981	34.14	28.66	1.75	2.78
Malta	4 010	1984	1986	25.17	9.13	2.10	6.89
Iran, I.R. of	3 557	1984	1986	9.51	2.52	1.39	1.94
Venezuela	3 230	1984	1986	19.97	13.75	1.45	4.48
Seychelles	3 180	1975	1977	19.34	6.21	1.92	9.47
Portugal	2 890	1984	1986	30.68	7.42	11.60	0.89
Gabon	2 750	1983	1985	27.46	18.04	2.44	6.22
Korea	2 690	1986	1987	14.92	4.48	7.08	2.63
Yugoslavia	2 480	1984	1986	5.58	0.00	4.27	2.58
Argentina	2 370	1982	1984	17.84	2.12	7.93	2.12
Suriname	2 360	1984	1986	20.76	9.37	2.52	7.93
Panama	2 240	1984	1986	21.56	6.41	4.38	3.07
Uruguay	2 180	1984	1986	13.30	1.57	9.05	2.66
Brazil	2 020	1984	1986	22.10	4.40	9.77	0.69
South Africa	1 890	1982	1984	22.85	12.39	7.43	0.83
Mexico	1 820	1982	1984	17.52	4.32	9.13	2.27
Syrian Arab Re.	1 820	1984	1986	12.75	5.94	2.14	1.74
Malaysia	1 820	1985	1987	20.02	10.22	4.58	4.70
Costa Rica	1 590	1983	1985	20.39	3.11	6.91	4.68
Jordan	1 540	1984	1986	18.61	3.19	3.38	8.54
Fuji	1 510	1984	1986	19.13	10.47	2.96	6.61
Mauritius	1 470	1985	1987	19.67	2.33	4.44	11.94
Peru	1 430	1984	1986	14.10	2.17	7.70	3.71
Chile	1 310	1984	1986	20.24	3.28	11.81	2.82
Belize	1 250	1983	1985	20.62	5.11	2.71	11.62
Colombia	1 220	1982	1984	11.41	2.58	4.55	1.53
Tunisia	1 210	1982	1984	23.24	4.69	7.18	10.10
Turkey	1 200	1985	1987	15.04	7.34	5.41	1.28
Ecuador	1 040	1983	1985	13.06	7.89	2.23	2.62
Botswana	1 030	1984	1986	26.36	17.56	0.55	8.21
Paraguay	1 000	1984	1986	8.29	1.15	2.49	1.12
Jamaica	960	1979	1981	19.21	8.38	14.39	1.34

Table 13.1 ***Developing Countries: Tax Revenue by Type of Tax (per cent of GDP) (continued)***

	GDP per capita (1987 dollars)	*Years*		*Total taxes*	*Income tax*	*Indirect taxes*	*Trade taxes*
Cameroon	960	1985	1987	13.94	9.14	2.60	3.50
Guatemala	940	1985	1986	6.53	0.98	0.00	0.00
Congo	880	1978	1980	24.53	17.21	2.69	4.57
Djbouti	860	1984	1986	24.39	4.66	15.39	1.65
El Salvador	850	1985	1987	12.23	2.51	4.80	4.22
Thailand	840	1985	1987	13.77	3.14	7.57	3.13
Nicaragua	830	1984	1986	28.21	4.87	18.05	3.57
Honduras	780	1979	1981	13.12	3.70	3.52	5.65
Cote d'Ivoire	750	1983	1985	14.98	3.10	4.49	7.62
Dominican Republic	730	1984	1986	11.43	2.34	4.34	3.92
Papua New Guinea	730	1984	1986	19.05	10.29	2.99	5.36
Egypt	710	1985	1987	18.19	5.83	4.33	5.39
Swaziland	700	1983	1985	25.41	6.74	1.00	17.21
Morocco	620	1984	1986	20.62	4.67	10.08	4.01
Zimbabwe	590	1983	1985	27.82	12.59	9.55	4.51
Philippines	590	1984	1986	9.90	2.76	4.24	2.63
Yemen Arab Rep.	580	1985	1987	13.72	2.27	1.94	7.13
Bolivia	570	1982	1984	4.55	0.47	2.01	0.95
Western Samoa	560	1982	1984	26.24	7.01	4.10	14.96
Senegal	510	1982	1984	17.38	3.88	5.40	7.19
Indonesia	450	1984	1986	16.91	12.28	3.45	0.81
Mauritania	440	1981	1983	17.17	5.57	2.82	8.56
Liberia	440	1984	1986	18.42	7.34	4.99	5.52
Solomon Islands	420	1985	1987	20.87	7.34	0.58	12.98
Sri Lanka	400	1984	1986	18.87	3.22	7.85	7.15
Ghana	390	1985	1987	11.33	2.61	3.31	5.39
Guyana	380	1983	1985	36.31	14.37	13.96	4.62
Comoros	380	1984	1986	12.95	1.64	1.11	9.91
Nigeria	370	1985	1987	6.49	6.34	0.86	1.65
Lesotho	360	1983	1985	38.62	4.36	4.15	29.90
Haiti	360	1985	1987	10.01	1.53	4.84	2.81
Pakistan	350	1984	1986	12.66	1.90	5.54	5.18
Kenya	340	1983	1985	20.03	6.33	8.67	4.35
Sudan	330	1980	1982	9.65	1.78	2.33	5.46
Rwanda	310	1978	1980	10.63	2.17	2.12	6.06
Benin	300	1977	1979	13.21	2.82	2.30	9.34
Maldives	300	1984	1986	15.28	0.48	3.87	10.49
Togo	300	1984	1986	21.97	10.20	2.72	8.77
Sierra Leone	300	1985	1987	5.52	1.61	1.40	2.63
India	300	1983	1985	15.52	2.07	9.69	3.16
Somalia	290	1975	1977	11.86	1.02	3.19	5.38
Niger	280	1978	1980	10.80	3.63	2.61	4.70

Table 13.1 ***Developing Countries: Tax Revenue by Type of Tax (per cent of GDP) (continued)***

	GDP per capita (1987 dollars)	*Years*		*Total taxes*	*Income tax*	*Indirect taxes*	*Trade taxes*
Uganda	260	1984	1986	11.74	0.74	2.74	8.26
Burundi	240	1979	1981	12.83	2.74	3.59	5.24
Zambia	240	1986	1988	21.36	5.59	8.20	7.41
Gambia, The	220	1984	1986	16.36	2.64	1.25	12.31
Tanzania	220	1983	1985	17.40	5.37	10.20	1.37
Madagascar	200	1980	1982	12.61	2.56	5.99	3.62
Mali	200	1984	1986	9.55	1.51	4.56	3.62
Burma	200	1984	1986	8.10	0.68	5.40	2.02
Burkina Faso	170	1984	1986	10.91	2.34	2.36	5.01
Guinea-Bissau	170	1984	1986	7.22	1.64	2.10	3.04

Source: V. Tanzi, *Public Finance in Developing Countries* (Aldershot: Edward Elgar, 1991).

mainly out of saving or have the most discouraging effects on incentives. For example, very progressive income tax will discourage work effort if the substitution effect of the tax outweighs the income effect; and to the extent that high marginal rates of tax fall primarily on the upper-income groups with low propensities to consume, saving may fall by nearly as much as tax revenue rises. To avoid such large reductions in private saving, an expenditure tax on upper-income groups, which exempts saving from taxation, is an alternative to a progressive income tax, but the disincentive effects on work effort are not necessarily avoided. This is so because if the expenditure tax encourages saving, the tax rate must be higher to yield the same revenue as the income tax. If people work to consume and the price of consumption is raised, work effort will be curtailed if the substitution effect of the change outweighs the income effect. The more successful the expenditure tax is in stimulating saving out of a given income, the higher must be the rate of tax to keep the yields from the two taxes equal, and the greater the disincentive to work effort is likely to be. If the expenditure tax is in addition to the income tax, however, there is no reason to expect any substitution effect in favour of private saving, so that whether aggregate community saving increases depends on how much work effort is discouraged and on the relative propensities to consume and save of those who pay the tax compared to those of the government. In general the most effective tax policy to raise the level of saving relative to income would be to impose taxes on those with high marginal propensities to consume, namely the poor, but there are obvious considerations of equity to bear in mind in pursuing such a policy as well as the practical consideration of political feasibility.

The predominant importance of agriculture in developing countries makes agricultural taxation a potentially significant source of tax revenue and a means of transferring resources into investment. There are a great variety of tax instruments for taxing agriculture, including taxes on land area, on land value, on net income, marketing taxes, export taxes, land transfer taxes, and so on. If revenue is the aim, then marketing and export taxes are probably the most efficient and the easiest to collect. As far as exports are concerned two main systems may be adopted. Either the state-controlled marketing board may pay the producer a price less than the international price received, or alternatively the government may require that all foreign exchange receipts be surrendered, with compensation given in local currency at an exchange rate which overvalues the local currency. Export taxes may, however, have disincentive effects. The substitution effect of export taxes will be to discourage production, or to switch production to the home market if the home market is not saturated. Either way, the yield from tax will fall if the tax base (the level of exports) falls more than in proportion to the rise in the export tax. In theory, land taxes are probably the most desirable way to transfer resources from agriculture, but in practice land taxes are not important as a source of tax revenue. It is also worth remarking that no developing country has yet successfully applied a conventional income tax to agricultural income. The nearest countries get is to tax the value of land, the imputed income from land or the potential physical yield from land.

The balance between direct taxes on income and indirect taxation on expenditures and trade in the economy at large is heavily weighted in the direction of the latter, particularly in the form of import duties and sales taxes (see **Table 13.1**). The emphasis on indirect taxes originates from the difficulties already mentioned of levying direct taxes, and the disincentive effects that direct taxes can have. This is not to say that indirect taxes are totally devoid of disincentive effects, but they are probably less, especially if taxes such as sales taxes and import duties can be levied on necessities without too much social hardship. Indirect taxes on luxuries will raise revenue, the more so the more price inelastic the demand, but the taxes may largely be paid out of saving to the extent that luxuries are consumed by the upper-income groups with low propensities to consume. The equity grounds for such taxation, however, are still strong.

Taxes on business are easy to collect and administer, but again business taxation may merely replace one form of saving with another. The marginal propensity to save out of profits is typically high. The main justification for company taxation must be to retain control of resources which might otherwise leave the country if the business is foreign-owned, or to substitute public for private investment on the grounds that public investment is more socially productive than its private counterpart.

Tax Reform in Developing Countries[1]

The efficient utilisation of the tax potential of developing countries raises problems which vary with the circumstances of each country, but there are certain fundamental changes in most of these countries which if adopted would make it possible to increase public revenue and reduce some of the inequities which now exist. Particularly, if a tax system is to be accepted by a poor community, it must be seen to be administered honestly and efficiently, which means that every attempt must be made to minimise the scope for avoidance (legal) and evasion (illegal).

According to the classical canons of taxation, a tax system is to be judged by the standards of equity, efficiency and administrative convenience. In most developing countries, the tax system is neither equitable nor efficient and is administratively cumbersome. Avoidance and evasion are rife.

Equity requires a comprehensive definition of income and non-discrimination between income sources. A major deficiency of tax systems all over the world, and particularly in developing countries, is that there is no single comprehensive tax on all income. Typically there is a 'cedular' system with separate taxes on different sources of income. Wage and salary earners ('earned' incomes) tend to be discriminated against *vis-à-vis* the owners of property and capital and the self-employed (professional people and small traders). An equitable system should also be such that it discourages luxury consumption and makes it difficult to avoid and evade taxation.

Taxable capacity is not measured by income alone, but also by wealth. Equity therefore also requires the taxation of wealth. The ownership of wealth endows the owner with an inherent taxable capacity, irrespective of the money income which the asset yields. Consider the case of a beggar with nothing and a rich man who holds all his wealth in the form of jewellery and gold which yields no money income. Judged by income their taxable capacity is the same: nil! Surely no one could claim, however, that their ability to pay was the same, and that for tax purposes they should be treated equally.

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[1] For an excellent discussion of general issues, and with specific references to Pakistan, see Ahmad and Stern (1991).

Income tax is not only inequitable between those with property and those without, but also *between* property holders. For example, two property holders may derive the same income from property but the value of their property may differ greatly. One has a greater taxable capacity than the other. Only a combination of income and property taxes can achieve equity according to ability to pay. This is the case for a **wealth tax.**

Equity also requires that gifts between individuals be taxed, on death and *inter-vivos.*

Efficiency requires that the entire tax system be self-reinforcing and self-checking so that the attempt to escape one tax increases the liability to other taxes. The system should also, as far as possible, be based on a comprehensive annual return.

The above considerations, stressed by Kaldor[1] on his many tax missions to developing countries, suggest at least four major reforms of the tax system in developing countries, which at the same time would release resources for investment and act as an incentive to effort:

1. That **all** income (including capital gains) be aggregated and taxed in the same way, at a progressive rate, but not exceeding a maximum marginal rate of, say, 50 per cent. Marginal rates above this level may not only discourage incentive but may also be counterproductive by encouraging evasion and avoidance.
2. The institution of a progressive personal expenditure tax levied on rich individuals who reach the maximum marginal rate of income tax.
3. The institution of a wealth tax.
4. The institution of a gifts tax.

Kaldor was a tax adviser to India, Sri Lanka, Turkey, Mexico, Ghana, British Guiana, Iran and Venezuela and recommended tax reform along these lines. Needless to say, the proposals were frequently met with opposition and rejection, not only by the ruling vested interests, but sometimes by workers as well. Kaldor's classic and pioneering report was prepared for India in 1956. There, many of the recommendations were first implemented, but then whittled down in force.

In Sri Lanka, the then Prime Minister, Mr Bandaranaike, was strong enough at the time for the proposals to be implemented, but successive governments were not powerful enough to enforce them. In Mexico, Kaldor's visit was so politically sensitive that his location in writing the Report was kept secret. Kaldor himself did not believe at the time that Mexico was politically ready for a progressive reform of the tax system, but the Finance Minister insisted and promised freedom to publish the Report. As it turned out the Report was never officially published, but was given instead to a series of committees for consideration. The proposals were then blocked by President Mateos and his Cabinet.

In Ghana, Kaldor was asked by Dr Nkrumah to advise on the budgetary position and tax system during the economic crisis there in 1961. Kaldor described the ambience of Nkrumah's government as that of a medieval court 'flamboyant, extravagant and corrupt'. Kaldor wanted to reform company taxation to prevent foreign firms escaping tax through transfer pricing, and to introduce a scheme of compulsory saving to aid the development effort. The latter proposals, however, led to political agitation and a workers' strike. In British Guiana, Kaldor's recommendations led to political disturbances so severe that the British military had to be called in. The trouble there brewed quickly because vested interests had anticipated his visit and made plans accordingly. There was particular dislike again of the proposed compulsory saving scheme, and an attempt was made by the trade unions to depose the goverment by strike action.

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[1] See Kaldor (1980). See also my book, *Nicholas Kaldor* (Brighton: Wheatsheaf Books, 1987).

In Turkey, where a land tax was proposed to encourage the more intensive use of land there was a collective resignation of the top officials of the State Planning Organisation and none of the proposals ever reached the legislative stage. Such is the fate of tax advisers in developing countries!

In his own retrospective reflections on his role as adviser, Kaldor says that through the unpopularity engendered, it became clear that the power behind the scenes of the wealthy property owning classes was very much greater than the political leaders suspected. But he did not repent: 'progressive taxation is, in the end, the only alternative to complete expropriation through violent revolution'.

Inflation, Saving and Growth

If voluntary and involuntary saving are inadequate, inflationary policies which 'force' saving by 'taxing' money and by redistributing income between classes within the private sector are an alternative possibility. The price of financial conservatism may well be economic stagnation. The potential benefits of inflationary finance, which embrace both the Keynesian and Quantity Theory approaches to development finance, have been discussed by economists[1] at least since David Hume, and several economic historians (including Keynes) claim to have discerned a relationship in history between periods of inflation and rapid economic development. Hamilton (1952) has claimed that inflation has been a powerful stimulant to growth in a wide number of historical contexts through the favourable effect of excess demand on profits, saving and investment; for example, in England and France in the sixteenth and seventeenth centuries and in England in the latter half of the eighteenth century. Rostow (1960) also claims that inflation has been important for several industrial take-offs. Keynes in the *Treatise on Money* similarly remarked on the apparent extraordinary correspondence in history between periods of inflation and deflation and national rise and decline, respectively. Keynes was certainly more predisposed to inflation than to deflation. He described inflation as unjust and deflation as inexpedient but of the two inflation is to be preferred because 'it is worse in an impoverished world to provoke unemployment than to disappoint the rentier' (Keynes (1931)). While recognising that inflation to increase capital accumulation may have regressive distributional consequences, he further argued that the long-run gains to the wage-earners can outweigh the short-term losses: 'the working class may benefit far more in the long run from the forced abstinence which a profit inflation imposes on them than they lose in the first instance in the shape of diminished consumption so long as wealth and its fruits are not consumed by the nominal owner but are accumulated' (Keynes (1930)).

The Keynesian Approach to the Finance of Development

The Keynesian approach to the finance of development by inflationary means stresses first that investment can generate its own saving by raising the level of income when the economy is operating below capacity, and by redistributing income from wage-earners with a low propensity to save to profit-earners with a high propensity to save when the economy is working at full capacity, and second that inflation itself can encourage investment by raising the nominal rate of return on investment and by reducing the real rate of interest. Only the first of these two aspects of the Keynesian approach will be considered here.

Unemployed resources provide the classic argument for Keynesian policies of inflationary finance. If resources are unemployed or underused, real output and real savings can be increased by governments running budget deficits financed either by printing money or by issuing government bonds to the banking system and the public.

In a situation of genuine 'Keynesian' unemployment any tendency towards inflation, whatever method of deficit finance is used, should burn itself out as the supply of goods rises to meet the additional purchasing power created. Some economists have questioned, however, whether the observed unemployment of labour in developing countries is strictly of the Keynesian variety, and whether the supply of output would respond very much to increased demand. An early exponent of this view was Professor Rao, who disputes the secondary repercussions on output as visualised by the multiplier process:

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[1] Including Malthus, Bentham, Thornton, Robertson and, more recently, Kaldor.

> the secondary, tertiary and other increases in income, output and employment visualised by the multiplier principle do not follow, even though the marginal propensity to consume is very high. This is because the consumption goods industries to which the increased demand is directed are not in a position to expand output and offer effective additional employment (Rao (1952)).

Professor Reddaway reiterates this view by questioning whether putting unlimited supplies of labour to work will have the significant real income multiplier repercussions that Keynesian theory suggests. Referring to road building he says:

> The secondary consequences of this, in the shape of additional demand for consumer goods, mainly serve to increase the demand for food; and the output of foods is not limited by the lack of demand, even though there is plenty of underemployed labour attached to agriculture. The extra demand consequently falls on the balance of payments [and/or] it serves to drive up prices. There is growth in the national income corresponding with the work done on the road building, but there is little or no multiplier effect (Reddaway (1963), pp. 8–9).

While there is some element of truth in these statements, there are arguments to be put on the other side. Some deficit-financed projects may have considerable secondary repercussions on output if they eliminate production bottlenecks at the same time. In the agricultural sector of developing countries, and in the production of consumer goods in the industrial sector, there are many opportunities for investment which can yield outputs several times the money value of capital invested in a very short space of time. In agriculture, the use of fertilisers and the provision of transport facilities are good examples. Credit expansion for these activities can soon generate output sufficient to absorb the demand-creating effects of the new money in circulation. In Ecuador, it has been estimated that with investment of between \$10 and \$15 of money capital per hectare (at 1960s prices), settlers can clear and cultivate land which yields output of between \$88 and \$145 for internal consumption and export, respectively (Bottomley (1965)). This is a very high output–capital ratio and the gestation period is short. In Morocco some of the investments as part of the employment-generating programme, particularly irrigation schemes, have yielded quick and high returns, especially evaluating costs and benefits at shadow prices (see Jackson and Turner (1973)).

Thus while it may be conceded that much of the unemployment in developing countries is not of the Keynesian variety, it does not follow that monetary expansion in conditions of unemployment cannot generate secondary employment and output effects. The capacity-generating effects need to be considered in conjunction with the emphasis on demand in Keynesian static multiplier theory.

Let us turn now to the Keynesian full-employment case. At full employment, inflation is the inevitable result of the Keynesian approach to development. In contrast to classical and neoclassical theory, Keynesian theory specifies independent saving and investment functions and allows price changes in reponse to excess demand in the goods market to raise saving by redistributing income. Inflation is the means by which resources are redistributed between consumption and investment. In Keynesian models, investment is not constrained by saving but by the inflation rate willing to be tolerated by wage-earners who have had their real wages cut.

If plans to invest exceed plans to save it is reasonable to suppose that both investors and consumers have their plans thwarted. Capital formation is less than firms desire, but greater than consumers plan to save. Let us assume, therefore, that the actual growth of capital is a linear combination of planned saving and planned investment:

$$\frac{dK}{K} = \alpha\frac{I}{K} + (1 - \alpha)\frac{S}{K} \qquad \alpha < 1 \quad (13.3)$$

where K is the quantity of capital, I is planned investment, and S is planned saving. Now assume that the rate of inflation is proportional to the degree of excess demand as measured by the difference between plans to invest and save:

$$\frac{dP}{P} = \lambda\left(\frac{I}{K} - \frac{S}{K}\right) \qquad \lambda > 0 \qquad (13.4)$$

where P is the price level. Substituting the expression for I/K into (13.3) gives:

$$\frac{dK}{K} = \frac{\alpha(dP/P)}{\lambda} + \frac{S}{K} \qquad (13.5)$$

S/K is planned saving and $\alpha(dP/P)/\lambda$ is forced saving, per unit of capital. Forced saving results from the inability of consumers to fulfil their planned consumption in conditions of excess demand. The underlying mechanism which thwarts the plans of consumers is the inflation which redistributes income from wage-earners to profits. Other things remaining the same, if prices rise faster than wages, real consumption will fall and real saving increase as long as the propensity to save out of profits is higher than the propensity to save out of wages. In Keynesian models, therefore, the effect of inflation on saving depends on two factors: first, the extent to which income is redistributed between wages and profits; and second, the extent of the difference in the propensity to save out of wages and profits. The relation between wages, prices and profits, and the consequent effect of income redistribution on saving, is best illustrated using simple algebra. Let Z be labour's share of national income so that:

$$Z = \frac{W}{PY} = \frac{wL}{PY} = \frac{w}{Pr} \qquad (13.6)$$

where W is the wage bill, w is the wage rate, P is price per unit of output, Y is income, and $r = Y/L$ is the productivity of labour. Hence, the rate of change of labour's share may be written:

$$\frac{dZ}{Z} = \left(\frac{dw}{w} - \frac{dP}{P}\right) - \frac{dr}{r} \qquad (13.7)$$

From this equation a number of interesting propositions can be established. First, given a positive rate of growth of productivity, a sufficient condition for a redistribution of income from wages to profits is that prices rise faster than wages. Note, however, that in a growing economy (with positive productivity growth) it is not a necessary condition. Labour's share will fall and the share of profits rise as long as $(dw/w - dP/P) < dr/r$; that is, as long as the real wage rises less than the growth of labour productivity. In a growing economy, therefore, there is no necessary clash between the real wage and profits. The real wage can rise and the share of profits in income can also rise as long as some of the gains in labour productivity are appropriated by the capitalists. Second, it can be shown that, on the classical savings assumptions that the propensity to save out of profits is unity and the propensity to save out of wages is zero, the rise in the aggregate savings ratio will be equal to the fall in labour's share of income. If all wages are consumed and all profits are saved equation (13.7) may be written as:

$$\frac{dZ}{Z} = \frac{dc}{c} - \frac{dr}{r} \qquad (13.8)$$

where c is real consumption per worker. Hence:

$$\frac{dZ}{Z} = \frac{dC}{C} - \frac{dY}{Y} = \frac{d(C/Y)}{C/Y}$$

where C is aggregate consumption, Y is income, and C/Y is the consumption–income ratio. Since $d(C/Y)/(C/Y) = -d(S/Y)/(C/Y)$, and $dZ = d(C/Y)$, we have the result that $-d(S/Y) = dZ$, i.e. labour's share and the aggregate savings ratio change by exactly the same amount (in opposite directions).

The basic Keynesian notion that investment determines saving forms the backbone of neo-Keynesian growth theory as expounded by Robinson (1962) and Kaldor (1955–6). Variations in the savings ratio resulting from inflation and income redistribution is one of the many possible adjustment mechanisms for raising the warranted growth rate towards the natural rate. As Robinson used to argue, in response to the neoclassical adjustment mechanisms of variations in interest rates and the capital–output ratio, there is nothing in the laws of nature to guarantee growth at the natural rate, but if entrepreneurs wish to invest sufficient to grow at the natural rate then saving will adapt, subject to an inflation barrier.[1] When a steady rate of growth is going on, the share of savings adapts to it. In effect, the actual growth rate pulls up the warranted growth rate by forcing saving. Saving adapts to investment through the dependence of saving on the share of profits in income which rises with the level of investment relative to income in the way that has already been described. Profits in turn depend on what happens to real wages when the system is out of equilibrium. The basic equation of Robinson's model is the distribution equation:

$$PY = wL + \pi PK \tag{13.9}$$

where π is the gross profit rate R/K, and P, Y, w, L and K are as before. Dividing through by P, and rearranging to obtain an expression for the profit rate, gives:

$$\pi = \frac{(Y/L) - (w/P)}{(K/L)} = \frac{R/L}{K/L} = \frac{R}{K} \tag{13.10}$$

Given the capital–labour ratio, the rate of profit depends on the relationship between output per head and the real wage. If all wages are consumed and all profits are saved, the rate of profit gives the rate of capital accumulation and the rate of growth. This follows since $S = I = \pi K$, and $\Delta K = \pi K$; therefore $\Delta K/K = \pi$. And if the capital–output ratio is fixed, $\Delta K/K = \Delta Y/Y$; hence $\pi = \Delta K/K = \Delta Y/Y$. Variations in the rate of profit and corresponding variations in the real wage provide the mechanism which equilibrates plans to save and invest and the actual and warranted growth rates. If the actual growth rate equals the natural rate, the warranted and natural growth rates will also be equalised. If the real wage remains unchanged as investment takes place, however, saving cannot adapt and a greater volume of real investment cannot be financed. This is the inflation barrier in a static model. It appears, in fact, that in a static context the growth rate can only be raised at the expense of the real wage, which comes close to the pessimistic development theories of Ricardo and Marx. In a growing economy such pessimism would be unfounded because it can be seen from equation (13.10) that the rate of profit and capital accumulation can rise even if the real wage is rising as long as the growth in labour productivity exceeds the increase in the real wage.

Kaldor in his model also makes saving adjust to the desired level of investment through a rise in the share of profits in national income. The model consists of three basic equations:

$$Y = W + R \tag{13.11}$$

$$I = S \tag{13.12}$$

$$S = s_w W + s_r R \tag{13.13}$$

where R is profits, W is wages, s_w is the propensity to save out of wages and s_r is the propensity to save out of profits. Using the three equations we can write:

$$\begin{aligned} I &= s_w(Y - R) + s_r R \\ &= (s_r - s_w)\, R + s_w Y \end{aligned} \tag{13.14}$$

and making investment the independent variable in the system, and dividing through by Y, gives:

$$\frac{R}{Y} = \left(\frac{1}{(s_r - s_w)}\right)\frac{I}{Y} - \frac{s_w}{(s_r - s_w)} \tag{13.15}$$

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[1] In a static economy the inflation barrier means a real wage so low that wage-earners react to price increases to prevent the real wage from falling further. In a growing economy, it is the point at which labour resists any further reduction in its share of national income, i.e. where labour appropriates all increases in labour productivity itself in the form of increased real wages.

The ratio of profits to income and the investment ratio are positively related as long as the propensity to save out of profits exceeds the propensity to save out of wages. The investment ratio must clearly be the independent variable in the system. Capitalists can decide how much they are going to consume and invest but they cannot decide how much profit they are going to make. If $s_r = 1$ and $s_w = 0$, then $I/Y = R/Y$, and, multiplying both sides of equation (13.15) by Y/K we have Robinson's result that the rate of profit, the rate of capital accumulation and the rate of growth are all equal. A higher level of investment can raise the rate of capital accumulation by raising the profit rate and the share of saving in total income, subject, of course, to the inflation barrier. The mechanism which gives this result is rising prices relative to wages.

It is interesting to consider, using a model like Kaldor's, how much inflation is necessary to raise the savings ratio by a given amount. There are two methods of approach to this question which can both be considered using the same model. One is to consider the redistributive effects of inflation through time and ask how much inflation there would have to be within a certain time period for the savings target to be achieved holding the parameters of the model constant. The second approach is to consider what increase in the rate of inflation is required for a once-for-all increase in the savings ratio of a given amount. Both methods of approach can be considered if Kaldor's model is formulated in continuous time. Taking a savings function of the Kaldor type, $S = s_w W + s_r R$, let:

$$S_t = s_w W_0 e^{wt} + s_r(Y_0 e^{pt} - W_0 e^{wt}) \qquad (13.16)$$

where W_0 is the initial wage bill, Y_0 is the initial income level, w is the rate of growth of wages, and p is the rate of growth of money income (= the rate of inflation). Dividing through by $Y_0 e^{pt}$ to obtain an expression for the savings ratio at time t, and rearranging, gives:

$$\left(\frac{S}{Y}\right)_t = \left(\frac{W_0}{Y_0}\right) e^{wt-pt}(s_w - s_r) + s_r \qquad (13.17)$$

Now let $w = a + \alpha(p)$, where a is the rate of autonomous wage change and α is the wage–price coefficient. Equation (13.17) may then be written:

$$\left(\frac{S}{Y}\right)_t = \left(\frac{W_0}{Y_0}\right) e^{p(\alpha-1)t+at}(s_w - s_r) + s_r \qquad (13.18)$$

The effect of inflation on the savings ratio through time can be ascertained by differentiating equation (13.18) with respect to time:

$$\frac{\partial (S/Y)_t}{\partial t} = [a + p(\alpha - 1)]\left(\frac{W_0}{Y_0}\right) e^{p(\alpha-1)t+at}(s_w - s_r) \qquad (13.19)$$

Given the target rise in the savings ratio required during a particular time period, an approximate solution to p can be obtained given the parameter values of the model.

To consider the increase in the inflation rate necessary to raise the savings ratio by a given amount differentiate equation (13.18) with respect to p:

$$\frac{\partial (S/Y)_t}{\partial p} = (a - 1)t\left(\frac{W_0}{Y_0}\right) e^{p(\alpha-1)+at}(s_w - s_r) \qquad (13.20)$$

The reciprocal of equation (13.20) then gives the extra inflation required to raise the savings ratio by one percentage point. The change in the savings ratio with respect to a change in the inflation rate can be seen to depend on four factors: (i) the difference in the propensity to save out of wages and profits $(s_w - s_r)$; (ii) the wage–price coefficient (α); (iii) labour's initial share of income (W_0/Y_0); and (iv) the rates of inflation and autonomous wage increases already prevailing (p and a). It is clear from equation (13.20) that if $\alpha = 1$ and/or $s_w = s_r$, there can be no redistribution effects on saving from generating extra inflation.

The extra inflation required to raise the savings ratio is very sensitive to the parameter values taken. On classical assumptions that $s_w = 0$ and $s_r = 1$, the extra inflation required to raise the savings ratio by one percentage point is relatively mild regardless of the value of the wage-price coefficient and the initial share of wages in income.[1] The classical assumptions are somewhat unrealistic, however. Taking Houthakker's (1965) long-run estimates of $s_w = 0.02$ and $s_r = 0.24$, combined with $W_0/Y_0 = 0.7$ and $\alpha = 0.5$, gives an inflation rate of 13 per cent (starting from zero) to raise the savings ratio by one percentage point. A wage–price coefficient of 0.9, however, raises the required rate to 66 per cent. Even Keynesians might agree that 66 per cent extra inflation to raise the savings ratio by one percentage point is a high price to pay for extra growth!

Reconciling the Prior-Saving *vs* Forced-Saving Approaches to Development

There can be little doubt that the traditional development literature and the governments of most developing countries have veered towards the classical view of development in policy prescriptions and in the formulation of plans. But there is surely scope for a more eclectic approach. It is not necessary to be a classicist to recognise the importance of voluntary saving in capital-scarce economies, and it should not be necessary to be a Keynesian to admit that investors may lay claim on real resources in excess of the community's plans to save. The Keynesian can welcome prior saving. What he disputes is that saving is necessary for investment; that investment is constrained by saving. As Robinson (1960, vol. II) has said in discussing the relation between savings and investment at full employment: 'We cannot return to the pre-Keynesian view that savings governs investment. The essential point of Keynes' teaching remains. It is decisions about how much investment is to be made that governs the rate at which wealth will accumulate, not decisions about savings.' A start at reconciliation would be for the prior-savings school to admit the possibility of forced saving and to reduce their aversion to demand inflation. Equally, the Keynesians could admit that saving depends on factors other than the functional distribution of income, and that for any desired savings–investment ratio inflation will be less, the more voluntary saving can be encouraged.

The Quantity Theory Approach to the Finance of Development

The quantity theory approach to the finance of development stresses the effect of inflation as a tax on real money balances. Suppose a government wishes to divert more of a country's resources to investment, one of the ways it can do so is to invest itself on society's behalf, financing the investment by expanding the money supply. In conditions where capital is already fully employed, monetary expansion will be inflationary. Inflation is the means by which resources are effectively transferred to government. Inflation imposes a **tax on money** holdings which consists of the reduction in the real purchasing power of money and of the real resources that the holders of money must forgo to restore the value of their money holdings. The base of the tax is the level of real cash balances (M/P), and the tax rate is the rate at which the real value of money is deteriorating, which is equal to the rate of inflation (dP/P). The real yield from the tax is the product of the tax base and the tax rate, i.e. $(M/P)(dP/P)$, which will be maximised (as in standard tax theory) where the elasticity of the base with respect to the rate of tax is equal to -1. If the rate of inflation is equal to the rate of monetary expansion, the real tax yield (R) will equal the real value of the new money issued, i.e. $(M/P)(dM/M) = dM/P$. If $dP/P > dM/M$, some of the potential tax yield will be lost owing to a reduction in the tax base. The inflation tax can be illustrated

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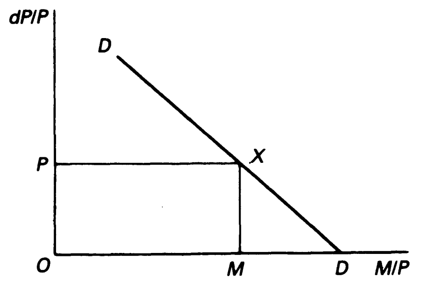
[1] The initial values of p and a can be ignored because for reasonable values the expression $e^{p(\alpha-1)+at}$ is approximately unity.

Figure 13.1



diagrammatically as in **Figure 13.1.** *DD* is the demand for real money balances in relation to the rate of inflation. When prices are stable, the demand for real balances is *OD*. At inflation rate *OP*, however, which is expected to continue, the demand for real balances falls to *OM*. The area *OPXM* thus represents the amount of real income that holders of real money balances must substitute for money balances to keep real balances intact at the level *OM*. Since money balances must be accumulated and real income forgone at the same rate as the rate of inflation, the rate of tax is equal to the rate of inflation. Inflation as a tax on money redistributes resources from the private sector to the government as the issuer of money – resources just as real as those obtained by more conventional means of taxation. Keynes was fully aware of this aspect of inflation, as well as the tendency for demand inflation to transfer income from wages to profits. In his *Tract on Monetary Reform* he describes inflation as 'a form of taxation that the public finds hard to evade and even the weakest government can enforce when it can enforce nothing else'.

The real yield from the inflation tax available for investment as a proportion of income (R_I/Y) will be the product of the money–income ratio, $(M/P)/Y$, the rate of inflation, $dP/P = dM/M$, and the proportion of the increase in the real money supply captured for investment $(R_I)(dM/P)$, that is:

$$\frac{R_I}{Y} = \left(\frac{M}{PY}\right)\left(\frac{dM}{M}\right)\left(\frac{R_I}{dM/P}\right) \qquad (13.21)$$

Suppose that the money–income ratio is 0.4: 1 and 50 per cent of new money issued is used for investment purposes, then a 10 per cent expansion of the money supply leading to a 10 per cent rate of inflation would yield 2 per cent of the national income for the development programme. If all the new money is used for investment purposes, the real yield from the tax is simply the ratio of the real value of the new money issued to income (our earlier result), which in this example would be 2.5 per cent. These calculations assume, however, that the desired ratio of money holdings to income remains unchanged regardless of the rate of inflation. In practice the ratio is likely to be a decreasing function of the rate of inflation because the opportunity cost of holding real money balances rises. Only if the base of the tax falls more than in proportion to the tax rate, however, will the yield from the inflation tax actually decline. From the limited evidence available, it appears that the elasticity of the money–income ratio with respect to the rate of inflation is quite low even in high-inflation countries. In sixteen Latin American countries the estimated elasticities of income velocity (the reciprocal of $(M/P)/Y$) with respect to the rate of inflation range between 0.01 and 0.12 (Hanson and Vogel (1973)). This suggests that inflation can operate effectively as a tax on money even in countries which have been experiencing high rates of inflation for many years. It should also be remembered that while inflation may reduce the desired ratio of money holdings to income, the ratio will have a continual tendency to rise with the gradual monetisation and development of the economy. On balance the ratio may be very little affected by monetary expansion.

It should also be added that government investment projects financed by monetary expansion can reduce an economy's capital–output ratio (if the projects have high output–labour ratios and low capital–labour ratios), enabling a higher rate of capital accumulation for any given investment ratio, and therefore a higher rate of employment growth.

Non-Inflationary Finance of Investment

Up to now it has been assumed that the rate of inflation is equal to the rate of monetary expansion. If output is growing, however, and/or the demand to hold money relative to income is rising, a proportion of the expansion of the money supply will be non-inflationary, enabling some government investment to be financed without any increase in the general price level. This is easily seen taking the fundamental equation of exchange:

$$MV = PY,$$

or

$$M = K_d PY \qquad (13.22)$$

where M is the nominal money supply, V is the income velocity of circulation of money, K_d ($=1/V$) is the demand to hold money per unit of money income, P is the average price of final goods and services, and Y is real income.

Taking rates of growth of the variables, denoted by lower-case letters, gives:

$$m = k_d + p + y \qquad (13.23)$$

It can be seen that if the demand for money per unit of income is increasing ($k_d > 0$), m can be positive without the price level rising. Similarly, if the economy is growing ($y > 0$), m can also be positive without the price level rising. The government's proceeds from monetary expansion will equal m–p. In several developing countries the rate of growth of the demand for money per unit of income seems to be of the order of 5 per cent per annum. This, combined with a growth rate of output of 5 per cent per annum, would mean that the non-inflationary growth of the money supply would be of the order of 10 per cent per annum.

To calculate the fraction of investment requirements to sustain a given rate of growth that can be financed without inflation, we assume for simplicity that the banks operate a 100 per cent reserve system.[1] Setting $p = 0$, the approximate increase in the demand for money is equal to the product of the money stock and the rate of growth of the money stock:

$$dM = Mm = M(k_d + y) \qquad (13.24)$$

Dividing through by Y gives:

$$\frac{dM}{Y} = \frac{M}{Y}(k_d + y) = K_d(k_d + y) \qquad (13.25)$$

If y is the target growth rate, and c_r is the required capital–output ratio, the investment ratio to achieve the growth rate is:

$$\frac{I}{Y} = c_r y \qquad (13.26)$$

Dividing equation (13.25) by (13.26) gives:

$$\frac{dM}{I} = \frac{K_d(k_d + y)}{c_r y} \qquad (13.27)$$

Equation (13.27) gives the proportion of total investment that can be financed by newly created money without leading to a rise in the price level. If $K_d = 0.3$, $k_d = 0.04$, $y = 0.03$ and $c_r = 3$, then $dM/I = 0.23$; that is, 23 per cent of total investment could be financed without inflation. The estimate is high because of the 100 per cent reserve ratio assumption, but the model is a good illustration of the potential that exists for the non-inflationary finance of development that results from the increased demand for money balances as the economy grows, and from the rise in the money–income ratio during the process of monetisation of the economy.

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[1] Using a fractional reserve system lowers the capacity to finance government investment without inflation.

Inflation and the Credit-Financed Growth Rate

An attempt has been made by Mundell (1965) to calculate the inflation rate required to raise the growth rate by any given amount on the assumptions of full employment and that monetary expansion is the only means of diverting resources to investment. We start with the fundamental equation of exchange in its rate of growth form (see equation (13.23)):

$$y = m + v - p \qquad (13.28)$$

Now let the equation for output be written as:

$$Y = \sigma K \qquad (13.29)$$

where σ is the productivity of capital (assumed constant). Differentiating equation (13.29) with respect to t gives:

$$\frac{dY}{dt} = \sigma \frac{dK}{dt} \qquad (13.30)$$

Now assume that all government investment is financed by borrowing from the central bank and that this is the only form of investment. The real value of government investment may be written as:

$$\frac{G}{P} = \frac{1}{P}\frac{dR}{dt} = \frac{dK}{dt} \qquad (13.31)$$

where R is bank reserves, and G is government investment. The relation between bank reserves and the money supply is:

$$R = rM \qquad (13.32)$$

where r is the fractional reserve ratio. Differentiating (13.32) with respect to t gives:

$$\frac{dR}{dt} = r\frac{dM}{dt} \qquad (13.33)$$

Substituting equation (13.33) into (13.31) and the result into (13.30) gives:

$$\frac{dY}{dt} = r\sigma \frac{1}{P}\frac{dM}{dt} \qquad (13.34)$$

Dividing (13.34) by Y gives:

$$\frac{dY}{dt}\frac{1}{Y} = r\sigma \frac{1}{PY}\frac{dM}{dt}$$

or

$$y = r\,\sigma\, m\frac{M}{PY} \qquad (13.35)$$

Equation (13.35) gives the relation between the rate of growth of output and the rate of growth of the money supply. Assuming for simplicity that the income velocity of money is constant ($v = 0$), the rate of change of prices is equal to the difference between the rate of monetary expansion and the growth of real output, i.e. $p = m - y$. Hence equation (13.35) may be written:

$$p = m - r\,\sigma\, m\frac{M}{PY} = \left(1 - \frac{r\sigma}{V}\right) m$$

or

$$p = \left(\frac{V}{r\sigma} - 1\right) y \qquad (13.36)$$

Equation (13.36) gives the relation between inflation and the credit-financed growth rate. For example, suppose $V = 3$, $\sigma = 0.5$ and $r = 0.3$, then from equation (13.36) we have $p = 19y$. To raise the growth rate by 1 per cent would require a tax on money of 19 per cent. Both the inflation rate implied by Mundell's model and the inflation rate implied by neo-Keynesian models look quite formidable if the growth rate is to be raised by means of inflation. The prospect looks even less favourable in Mundell's model if it is assumed that the income velocity of circulation of money rises as inflation proceeds. To incorporate the effect of inflation on velocity into the model, assume that velocity is a linear function of the inflation rate:

$$V = V_0 + \beta_0 (p) \qquad (13.37)$$

Substituting (13.37) into (13.36) gives:

$$p = \left[\frac{(V_0/r\sigma) - 1}{1 - (\beta_0/r\sigma)y} \right] y \qquad (13.38)$$

From equation (13.38) it can be seen that the inflation-growth coefficient now increases with the growth rate because higher growth through inflation involves an increased velocity of circulation of money. There is now a limit to which growth can be financed by borrowing from the central bank given by $y = r\sigma/\beta_0$. This is the value of y when the denominator of equation (13.38) is zero. If, for example, $\beta_0 = 10$, to raise the growth rate by 1 per cent requires a 57 per cent rate of inflation ($p = 0.57$), and the maximum growth rate possible (the growth rate at which inflation in infinite) is 1.5 per cent.

■ The Dangers of Inflation

Some of the advantages of inflation have been considered, especially the ability of inflation to release resources for development by the redistribution of income between classes within the private sector and from the private sector to the government. Inflation is not without its dangers, however, and these must be briefly mentioned. First, a distinction needs to be made between the different types of inflation that may be experienced by a developing country: **demand inflation, cost inflation** and **structural inflation.** The argument for inflationary finance is an argument for demand inflation. Cost inflation by reducing profits will not be conducive to development. Structural inflation may be the inevitable price of development but there is nothing in the process of structural inflation itself that will necessarily accelerate the development process.

There are also certain dangers and costs involved in pursuing a deliberate inflationary policy to stimulate development which need to be borne in mind. The most serious threats to growth from inflation come from the effect on the balance of payments if foreign exchange is a scarce resource, and from the possibility that voluntary saving, productive investment and the use of money as a medium of exchange may be discouraged if inflation becomes excessive. If one country inflates at a faster rate than others, its balance of payments may suffer severely, necessitating import-substitution policies and exchange controls, thus leading to inefficiency in resource allocation. As far as investment is concerned, if inflation becomes excessive, investment in physical plant and equipment may become unattractive relative to speculative investments in inventories, overseas assets, property and artefacts which absorb a society's real resources. If the real rate of interest becomes negative (i.e. the rate of inflation exceeds the nominal rate of interest) it may even become attractive to claim real resources and not to use them.

Inflation clearly reduces the purchasing power of money. If inflation becomes excessive not only may voluntary saving be discouraged but the use of money as a medium of exchange may be discouraged, involving society in real resource costs and welfare losses. Since inflation reduces the purchasing power of money, holders may be expected to avoid the loss by cutting down their holdings of money for transactions purposes. The cost of inflation arises from the fact that cash balances yield utility and contribute to production, and inflation causes energy, time and resources to be devoted to minimising the use of cash balances which are costless to produce, e.g. the frequency of trips to the bank may increase, which absorbs labour time, and credit mechanisms may be resorted to, which absorb society's resources.

There are also the distributional consequences of inflation to consider. These are difficult to assess. All that can be said with some confidence is the following: debtors benefit at the expense of creditors; profit-earners gain at the expense of wage-earners in times of demand inflation and lose at the expense of wage-earners in times of wage inflation; real-asset holders probably gain relative to money-asset holders; the strong (in a bargaining sense) probably gain relative to the weak and the young gain relative to the old, who tend to live on fixed contractual incomes. In developing countries the possible inegalitarian distributional consequences of demand inflation should not be allowed, however, to constitute an argument against the use of mildly inflationary policies if one of the objects of the policies is to create additional employment. The major beneficiaries of inflationary finance should be the unemployed and the underemployed, which represents a move towards a more egalitarian structure of household incomes.

Having considered some of the potential dangers of inflation it can be seen that there is plenty of room for disagreement over whether inflation is a help or a hindrance to development. Some argue that it can help to raise the level of real saving and encourage investment, while others maintain that it is liable to stimulate the 'wrong' type of investment and that inflation may get out of control and retard development through its adverse effects on productive investment and the balance of payments. A lot clearly depends on the type of inflation under discussion and its rate. What is badly needed is a substantial body of empirical evidence (both cross-section and time-series) of the relation between inflation and some of the key variables in the development process, especially savings and investment, as well as between inflation and development itself. There is some evidence which is considered below, but it is very inconclusive.[1]

Inflation and Growth: The Empirical Evidence

In a study by the present author (Thirlwall and Barton (1971)), taking fifty-one countries over the period 1958–67, no significant relation was found between inflation and growth over the whole sample, although some interesting results emerged when the sample was split according to the level of *per capita* income and the rate of inflation. For example, for seventeen developed countries with *per capita* incomes in excess of $800 per annum, all of which experienced mild inflation between 3 and 8 per cent per annum, the following result was obtained: $g = 2.79 + 0.61\,p$; $r^2 = 0.48$, where g is the growth rate and p is the rate of inflation. For the developing countries the evidence was inconclusive, except that there appeared to be a definite *negative* relation between inflation and growth among countries which experienced annual rates of inflation in excess of 10 per cent. Over all countries, it was found that mild inflation tends to be associated with the highest ratio of investment to income, compared with countries with relative price stability or inflation in excess of 10 per cent.

In a study of thirty-one developing countries, Tun Wai (1959) found a positive relation between inflation and growth up to a critical inflation rate, after which growth apparently declined. This is the type of relation that one might expect in the light of our discussion of the advantages and dangers of inflation. In Tun Wai's model, the inflation rate which maximises the growth rate is 12.8 per cent. Other economists have suggested between 5 and 10 per cent inflation as the optimum rate of inflation (e.g. Harberger (1964)). Dorrance (1966), in a similar statistical study, finds that the evidence supports the argument for mild inflation.

On the other hand, Wallich (1969), in a cross-section of forty-three countries over the period 1956–65, finds inflation and growth negatively related. A rate of inflation of 1 per cent above the average appears to be associated with a growth rate of 0.04 percentage points below the average. Wallich blames the effect of inflation on the quality, distribution and cost of investment.[2]

The Inflationary Experience

Having discussed the advantages of inflation, and warned of the dangers of excessive inflation, the fact is that the inflationary experience of most developing countries outside Latin America, at least until the recent past, was extremely mild. It was a myth that developing countries were typically prone to high rates of inflation. Out of a sample of forty-eight developing countries over the period 1958–68, thirty-eight recorded average rates of inflation of less than 6 per cent per annum (see Thirlwall (1974), p. 35 and appendix 1). Over the period of 1949–65 Adekunle (1968) found an average rate of inflation of 3.6 per cent for twenty-four developing countries compared with over 4.0 per cent for a sample of twenty-three more developed countries. In a further study, Jackson, Turner and Wilkinson (1972) also show the mild, and broadly uniform, inflationary experience of most developing countries outside Latin America. Two distinct groupings were observed: one around a mean rate of inflation of 3 per cent per annum, the other around a mean rate of 30 per cent per annum, with only a very small group in between. Historically, most developing countries have been very conservative financially.

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[1] For the most up-to-date survey of models and evidence, see Johnson (1984).

[2] All these studies refer to a period when the rate of world inflation was mild, before the price of oil and other commodities rose so dramatically in the early 1970s.

In the 1970s there was a marked acceleration in the rate of inflation, and **Table 13.2** compares and contrasts the rate of inflation between groups of countries pre- and post-1980.

Table 13.2 *Average Rates of Inflation by Income Group (%)*

	1965–80	*1980–90*
Low income countries	4.5	9.6
China and India	2.7	6.8
Middle-income countries	21.1	85.6
Industrialised countries	7.6	4.5

Source: *World Development Report*, 1992 (World Bank).

Over the period 1965–90 the rate of inflation has averaged 7 per cent in low income countries, over 50 per cent in the middle income countries, and 6 per cent in the industrialised countries. The average rates of inflation for individual countries are shown in **Table 1.2** (p. 15). There is a wide variety of experience exhibited between countries but on balance the developing countries seem to have been only slightly more inflation prone than the developed countries, with the notable exception of some of the countries in Latin America, where inflation has been endemic for many years, almost from the start of the industrialisation process. This chapter concludes with a brief discussion of the Latin American experience and of the 'structuralist–monetarist' controversy over the causes of rapid inflation.

The Structuralist–Monetarist Debate in Latin America

Since 1965, the inflation rate in Bolivia, Peru, Argentina and Brazil has averaged over 100 per cent per annum. In Chile, Mexico and Uruguay it has averaged from 40 to 70 per cent. Only in Venezuela, Colombia and Paraguay has the rate been relatively mild at 20 per cent. A heated debate developed in the early post-war years, which still smoulders today, over the primary impetus behind rapid price increases. Participants in the debate polarised into two schools, frequently referred to as the 'structuralists' and the 'monetarists'. Although the debate is set in the Latin American context, it is none the less of general interest and in many ways has been analogous to the Keynesian-monetarist debate over the causes of inflation in developed countries. It might also be said that the two debates have been equally sterile and inconclusive.

The essence of the structuralist argument is that price stability can only be attained through selective and managed policies for economic growth. It is claimed that the basic forces of inflation are structural in nature, that inflation is a supply phenomenon and, as such, can only be remedied by monetary and fiscal means at the expense of intolerable underutilisation of resources. Structuralists do not deny that inflation could not persist for long without monetary expansion, but they regard this as irrelevant because price stability could only be achieved by monetary means at the cost of stagnation and underemployed resources. Thus the role of financial factors in propagating inflations is not denied; what is disputed is that inflation has its *origins* in monetary factors. In the structuralists' view, monetary policy would only attack the symptoms of inflation, not its root causes. They argue further that, owing to the instability of export proceeds, and the slower growth of exports relative to the demand for imports, the control of inflation in the short run, for balance-of-payments reasons, is virtually impossible without external assistance, unless growth is to dry up completely.

In support of their case that inflation emanates from the supply side, the structuralists point to the characteristic features of developing countries: the rapid structural changes taking place in the economy, the supply inelasticities leading to bottlenecks, etc., and refer back to the pre-industrialisation era in Latin America when inflation was much less severe than it has been in the recent past. The main plank of the argument, and on which blame for inflation is placed, seems to be the lack of preparedness for industrialisation. Prior to 1930 there was relative price stability due to fairly elastic supplies of agricultural output and low population growth. It is claimed, however, that Latin America entered the industrialisation era burdened with a capitalist class unwilling to invest and a growing pressure of population on food supplies, which together contributed to bottlenecks and the beginnings of inflation – subsequently exacerbated by a wage–price spiral.

There is some dispute, though, whether this is an accurate picture for the whole of Latin America. According to some observers the sequence of events described by the structuralist school is more a description of a particular country, Chile. Indeed, Campos (1961) has gone as far as to say that any visitor to the Economic Commission for Latin America in Santiago cannot help feeling that the thinking of the structuralist school has been affected by the peculiarities of the Chilean inflation. But Campos is a confessed monetarist! For even in the Chilean case he claims that the bottlenecks observed were induced by inflation itself and were not causal elements in the process. This is a more general claim of the monetarist school. They argue that supply bottlenecks are created by policies which discourage investment, e.g. price controls. Thus they maintain that the process of repressing inflation (which is fairly typical in Latin America), instead of tackling the root causes of inflation, creates bottlenecks which subsequently feed the inflation. But in the first instance inflation is caused by excess demand due to monetary expansion. And balance-of-payments difficulties are also ascribed to monetary irresponsibility. In summary, the monetarists hold that the only way to curb inflation is through monetary and fiscal policy to dampen demand, and that most of the alleged supply inelasticities and bottlenecks are not autonomous, or structural, but result from price and exchange-rate distortions generated in the inflationary process. And on the broader question of whether or not the inflation is desirable in the interests of development, the answer of the monetarists is an unequivocal 'no'.

It is true that it is hard to find a systematic relation between the rate of inflation and the rate of development. If anything, the relation may be negative. Argentina, Chile and Bolivia have stagnated with rapid increases in the price level, while Mexico, Venezuela and Ecuador, which stand lower in the inflation league, have developed comparatively quickly. It also seems to be the case that in countries where prices have risen fastest the money supply has also grown most rapidly, at rates of between 20 and 30 per cent per annum. Neither of these observations, however, answers the question of whether monetary expansion initiates inflation or whether it simply stokes inflationary tendencies already present on the supply side. Moreover, if monetary expansion was curtailed, would it be output or prices that would fall the most? There is no consensus, but a majority of observers, as far as Peru, Argentina and Chile are concerned, seem to pinpoint supply factors as the main contributors to rising prices. In the case of Chile and Argentina, especially, there seems to be a fair degree of unanimity that inflation has resulted from a combination of policies to foster high-priced import-substitute activities and exchange depreciation due to balance-of-payments difficulties. It is of course possible to argue that all balance-of-payments deficits are a monetary phenomenon, but the more relevant question is: what is the cost of balance-of-payments stability in terms of growth? If the cost is high, inflation may be regarded as the price paid for the worthy goal of attempting to maintain growth in the face of balance-of-payments deficits. There is a case, at least for policy-making purposes, for regarding inflation as primarily a supply phenomenon if a reasonable rate of growth is incompatible with a balance on international account, or if price stability is only compatible with massive underutilisation of resources. A case in point is Chile. Some past evidence for the modern sector of Chile suggested, for example, that while wage-rate increases and prices are responsive to variations in the pressure of demand, complete wage and price stability would require unemployment rates of between 15 and 20 per cent (Coot (1969)). This is *prima facie* evidence of extreme structural disequilibrium in the economy, and although demand management could be used to control inflation, the extent of unemployment implied would be very high indeed. In situations like this, what is clearly required are policies on the supply side to bring about a greater degree of balance between sub-markets so as to shift inwards the 'trade-off' curve (as conventionally drawn) between inflation and the pressure of demand in the total economy.[1]

What, then, are we to make of these two schools of thought on inflation in Latin America, and the relatively scanty evidence on which to make a judgement? The best solution is undoubtedly to play safe and steer a middle course. Indeed, it would not be difficult to defend the view, even without much knowledge of individual situations, that inflation has probably been a combination of both demand and supply factors; all inflations, other than hyperinflations, usually are!

Questions for Discussion and Review

1. What is the difference between voluntary saving, compulsory saving, and 'forced' saving?
2. What are the main determinants of voluntary saving?
3. How can 'monetisation' of the economy help to raise the level and productivity of capital accumulation in developing economies?
4. What factors determine the rate of monetary expansion consistent with stable prices?
5. What are the advantages of credit money over commodity money for a developing country?
6. Suggest reforms to the tax system in developing countries that would promote both equity and capital accumulation.
7. What is meant by 'inflation as a tax on money'?
8. In what ways is demand inflation conducive to growth and development?
9. Should interest rates be as high, or as low, as possible for rapid development?
10. What is the role of special development banks in the development process?

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[1] For a 'structural' interpretation of Bolivian hyperinflation, see Pastor (1991).

■ Chapter 14 ■

Foreign Assistance, Debt and Development

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■ Introduction

In an open economy domestic savings can be supplemented by many kinds of external assistance. In this section the role of foreign borrowing in the development process will be considered, together with the debt-servicing problems associated with it, and particularly the debt 'crisis' of the 1980s. Later, we shall consider types of foreign assistance including bilateral assistance from the developed countries, multilateral assistance from the World Bank, and private foreign investment. The criticisms of foreign assistance will come under close scrutiny. In this chapter the emphasis is on longer-term resource flows to developing countries rather than on the provision of short-term balance-of-payments support which is the traditional function of the International Monetary Fund which we consider in Chapter 16.

It is important to appreciate that lending and borrowing are natural features of capitalist economic activity without which capital accumulation would be confined to sectors of economic activity which have a surplus of income over current requirements, which would be inefficient and suboptimal from a growth point of view. Very often the factors which cause the supply of capital to increase create its own demand. The most obvious example of this, at the international level, in recent years was the increase in the price of oil in 1973 and 1979 which created both large surpluses for oil-exporting countries and the need to borrow by oil-importing countries to maintain economic growth without curtailing imports. Going back into history, sovereign lending (and the problems associated with it) has been a feature of international economic life at least since the Medicis of Florence started making loans to the English and Spanish monarchs in the fourteenth century. Historically, the international lending and borrowing process has played an integral part in the development of most major industrialised countries, and continues to play a significant role in the economic transformation of today's developing countries.

Traditionally, the role of foreign borrowing was seen by countries as a supplement to domestic saving to bridge a savings–investment gap for the achievement of faster growth. The concept of **dual-gap analysis**, however, pioneered by Hollis Chenery and his collaborators (see later), shows that foreign borrowing may also be viewed as a supplement to foreign exchange if to achieve a faster rate of growth and development the gap between foreign exchange earnings from exports and necessary imports is larger than the domestic savings–investment gap, and domestic and foreign resources are not easily substitutable for one another. Foreign borrowing must fill the larger of the two gaps if the target growth rate is to be achieved. The historical sequence of experience originally suggested by Chenery was that countries in the pre take-off stage of development would have a dominant savings–investment gap, then followed by a dominant foreign exchange gap, with the possibility of a skill constraint at any stage. Most of today's developing countries, apart from the oil-producing and oil-exporting countries, have a dominant foreign exchange gap, which manifests itself in a chronic balance of payments deficit on current account, while domestic resources lie idle. These deficits require financing not only in the interests of the countries themselves, but for the sake of the growth momentum of the whole world economy. There is a mutual interdependence in the world economic system because countries are linked through trade. The alternative to the financing of deficits is adjustment by deflation, which means slower growth in the system as a whole.

If the historical experience of countries now developed is considered, in cases where borrowing took place (mainly from the United Kingdom as the major creditor) the borrowing was ultimately converted into an export surplus which enabled the country to redeem its debt and to become a net creditor. The condition for this to happen is that the marginal savings ratio should exceed the average to eliminate a savings–investment gap if that is the dominant constraint, or that the marginal propensity to export should exceed the marginal propensity to import if foreign exchange is the dominant constraint. For most developing countries today there is little evidence that they have either the desire or the ability to reduce the level of net resource inflows and indebtedness – without major disruption of their economies. The need for resources is as acute as ever, and indebtedness mounts because of a dominant foreign exchange gap to meet development requirements and to pay interest and amortisation on past borrowing. The countries find it difficult to convert domestic resources into foreign exchange in adequate quantities, not only cyclically when the world economy is depressed, but also secularly owing to their economic structure which produces goods, the demand for which tends to be both price and income inelastic in world trade. In the first edition of this book in 1972, I predicted: 'unless something is done the debt servicing problem arising from mounting resource flows may well become unmanageable in the not too distant future. It will certainly be a long time before these countries become net exporters of capital even in the absence of a savings–investment gap.' This prediction was made even before the Organization of Petroleum Exporting Countries (OPEC) cartel first exerted its influence on the world economy in that fateful month of December 1973. Third world debt now stands at $1400 billion, and $130 billion flows out of the developing countries each year to service the debts.

Dual-Gap Analysis and Foreign Borrowing

In national income accounting an excess of investment over domestic saving is equivalent to a surplus of imports over exports. The national income equation can be written from the expenditure side as:

$$\text{Income} = \text{Consumption} + \text{Investment} + \text{Exports} - \text{Imports}$$

Since saving is equal to income minus consumption, we have:

$$\text{Saving} = \text{Investment} + \text{Exports} - \text{Imports}$$

or

$$\text{Investment} - \text{Savings} = \text{Imports} - \text{Exports}$$

A surplus of imports over exports financed by foreign borrowing allows a country to spend more than it produces or to invest more than it saves.

Notice that in accounting terms the amount of foreign borrowing required to supplement domestic savings is the same whether the need is just for more resources for capital formation or for imports as well. The identity between the two gaps, the investment–savings (I–S) gap and the import–export (M–X) gap, follows from the nature of the accounting procedures. It is a matter of arithmetic that if a country invests more than it saves this will show up in the accounts as a balance-of-payments deficit. Or to put it a different way, an excess of imports over exports necessarily implies an excess of resources used by an economy over resources supplied by it, or an excess of investment over saving. There is no reason in principle, however, why the two gaps should be equal *ex ante* (in a planned sense), i.e. that *plans* to invest in excess of *planned* saving should exactly equal *plans* to import in excess of *plans* to export. This is the starting-point of dual-gap analysis.

Before going into dual-gap analysis in more detail, a reminder of elementary growth theory is in order. Growth requires investment goods which may either be provided domestically or be purchased from abroad. The domestic provision requires saving; the foreign provision requires foreign exchange. If it is assumed that some investment goods for growth can only be provided from abroad, there is always a minimum amount of foreign exchange required to sustain the growth process. In the Harrod model of growth it will be remembered that the relation between growth and saving is given by the incremental capital–output ration (c), which is the reciprocal of the productivity of capital (p) i.e. $g = s/c$ or $g = sp$, where g is the growth rate and s is the saving ratio. Likewise the growth rate can be expressed as the product of the incremental output–import ratio ($\Delta Y/M = m'$) and the ratio of investment good imports to income ($(M/Y) = i$) i.e. $g = im'$.

If there is a lack of substitutability between domestic and foreign resources, growth will be constrained by whatever factor is the most limiting – domestic saving or foreign exchange. Suppose, for example, that the growth rate permitted by domestic saving is less than the growth rate permitted by the availability of foreign exchange. In this case, **growth would be savings-limited** and if the constraint is not lifted, a proportion of foreign exchange will go unused. For example, suppose that the product of the savings ratio (s) and the productivity of capital (p) gives a permissible growth rate of 5 per cent, and the product of the import ratio (i) and the productivity of imports (m') gives a permissible growth rate of 6 per cent. Growth is constrained to 5 per cent, and for a given m' a proportion of the foreign exchange available cannot be absorbed (at least for the purposes of growth). Contrawise, suppose that the growth rate permitted by domestic savings is higher than that permitted by the availability of foreign exchange. In that case the country would be **foreign exchange constrained** and a proportion of domestic saving would go unused. The policy implications are clear: there will be resource waste as long as one resource constraint is dominant. If foreign exchange is the dominant constraint ways must be found of using unused domestic resources to earn more foreign exchange, and/or to raise the productivity of imports. If domestic saving is the dominant constraint ways must be found of using foreign exchange to augment domestic saving, and/or raise the productivity of domestic resources (by relaxing a skill constraint, for example).

Suppose now a country sets a target rate of growth, r. From our simple growth equations (identities), the required savings ratio (s^*) to achieve the target is $s^* = r/p$, and the required import ratio (i^*) is $i^* = r/m'$. If domestic saving is calculated to be less than the level required to achieve the target rate of growth, there is said to exist an investment-savings gap equal at time t, to:

$$I_t - S_t = s^* Y_t = \left(\frac{r}{p}\right) Y_t - sY_t \qquad (14.1)$$

Similarly, if minimum import requirements to achieve the growth target are calculated to be greater than the maximum level of export earnings available for investment purposes, there is said to exist an import–export gap, or foreign exchange gap, equal at time t, to:

$$\begin{aligned} M_t - X_t &= i^* Y_t - iY_t \\ &= \left(\frac{r}{m'}\right) Y_t - iY_t, \qquad (14.2) \end{aligned}$$

where i is the ratio of imports to output which is permitted by export earnings. If the target growth rate is to be achieved, foreign capital flows must fill the largest of the two gaps. The two gaps are not additive. If the import–export gap is the larger, then foreign borrowing to fill it will also fill the investment–saving gap. If the investment–saving gap is the larger, foreign borrowing to fill it will obviously cover the smaller foreign exchange gap.

The distinctive contribution of dual-gap analysis to development theory is that if foreign exchange is the dominant constraint it points to the dual role of foreign borrowing in supplementing not only deficient domestic saving but also foreign exchange. Dual-gap theory thus performs the valuable service of emphasising the role of imports and foreign exchange in the development process. It synthesises traditional and more modern views concerning aid, trade and development. On the one hand it embraces the traditional view of foreign assistance as merely a boost to domestic saving; on the other hand, it takes the more modern view that many goods necessary for growth cannot be produced by the developing countries themselves and must therefore be imported with the aid of foreign assistance. Indeed, if foreign exchange is truly the dominant constraint, it can be argued that dual-gap analysis also presents a more relevant theory of trade for developing countries which justifies protection and import substitution (Linder (1967)). If growth is constrained by a lack of foreign exchange, free trade cannot guarantee simultaneous internal and external equilibrium, and the gains from trade may be offset by the underutilisation of domestic resources. We shall take up this matter in Chapter 15. Before evaluating the assumptions of dual-gap analysis, and its practical policy implications, however, let us first analyse the two gaps in more detail and consider the role of foreign borrowing in relation to them.

■ The Investment–Savings Gap

Suppose to start with that we assume that the I–S gap is the larger of the two gaps, so that foreign borrowing must be sufficient to meet the shortfall of domestic saving below the level necessary to achieve the target rate of growth. What we wish to consider is the size of the initial gap that must be filled by foreign borrowing and the determinants of the size of the gap to be filled in future years by foreign assistance. If the gap is to narrow, and foreign borrowing is to be terminated, the presumption must be that additional increments to saving out of the increases in national income generated are greater than the increments of investment. For any target rate of growth, r, the required foreign assistance in the base year (F_0) is:

$$\begin{aligned} F_0 &= I_0 - S_0 = Y_0cr - Y_0s_a \\ &= Y_0(cr - s_a) \qquad (14.3) \end{aligned}$$

where I_0 is investment in the base period, S_0 is savings in the base period, Y_0 is income in the base period, c is the incremental capital-output ratio, s_a is the average savings ratio, and r is the target rate of growth.

If the rate of saving is expected to rise over time, the savings function may now be written as:

$$\begin{aligned} S_t &= s_aY_0 + s'(Y_t - Y_0) \\ &= (s_a - s')Y_0 + s'Y_t \qquad (14.4) \end{aligned}$$

where s' is the marginal savings ratio. Rewriting investment requirements at time t as:

$$I_t = Y_tcr \qquad (14.5)$$

and combining (14.4) and (14.5), we get the net inflow of capital required in time t:

$$F_t = Y_tcr - [(s_a - s')Y_0 + s'Y_t] \qquad (14.6)$$

or

$$F_t = (cr - s')Y_t + (s' - s_a)Y_0 \qquad (14.7)$$

The difference between borrowing requirements in the base year and borrowing in period t is the difference between equations (14.7) and (14.3), which reduces to:

$$cr\,(Y_t - Y_0) - s'\,(Y_t - Y_0)$$

or

$$F_t - F_0 = \Delta I - \Delta S \qquad (14.8)$$

i.e. increments is external capital finance the difference between investment requirements to sustain the target rate of growth and increases in saving generated by rising income. If foreign assistance is to decline (i.e. $F_t < F_0$), ΔS must be greater than ΔI. The investment–savings gap will disappear, and the phase of investment-limited growth come to an end, when domestic saving reaches a level adequate to sustain the target rate of growth.

From (14.7) the rate of growth that can be achieved with an exogenously given inflow of foreign capital is:[1]

$$r = \frac{1}{c}\left((s_a - s')\frac{Y_0}{Y_t} + s' + \frac{F_t}{Y_t}\right) \qquad (14.9)$$

The derivative of r with respect to F is positive, so that a larger inflow of foreign capital can achieve a higher growth rate, provided there is no rise in c – the capital–output ratio – or fall in s'.[2]

From (14.7) we can also calculate the number of years after which a country can generate enough domestic saving to finance its target rate of growth and dispense with foreign borrowing. Equation (14.7) becomes in the nth year, when $F_n = 0$:

$$(cr - s')Y_n + (s' - s_a)Y_0 = 0 \qquad (14.10)$$

$$Y_n = \left(\frac{s' - s_a}{s' - cr}\right) Y_0 \qquad (14.11)$$

Since

$$Y_n = Y_0(1 + r)^n \qquad (14.12)$$

then

$$(1 + r)^n = \frac{s' - s_a}{s' - cr} \qquad (14.13)$$

from which n can be calculated. We stress again that the essential condition for a country to reduce its external borrowing requirements is that the marginal rate of saving should exceed the required rate of investment, i.e. $s' > cr$ in (14.13) above. n is obviously highly sensitive to s' and c.

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[1] Not necessarily that inflow to achieve the target rate of growth.

[2] The model also ignores how the inflow of foreign capital is financed. This matter is taken up in a later section.

The Import–Export, or Foreign Exchange, Gap

Now let us suppose that the M–X gap is the larger of the two gaps. In the base year the foreign assistance required to cover the foreign exchange gap is:

$$\begin{aligned} F_0 &= M_0 - X_0 = Y_0 m_a - Y_0 x_a \\ &= Y_0(m_a - x_a) \end{aligned} \qquad (14.14)$$

where M_0 is imports in the base period, X_0 is exports in the base period, Y_0 is income in the base period, m_a is the average import coefficient, and x_a is the average export coefficient.

If imports in year t equal:

$$M_t = m_a Y_0 + m'(Y_t - Y_0) \qquad (14.15)$$

and exports in year t equal:

$$X_t = x_a Y_0 + x'(Y_t - Y_0) \qquad (14.16)$$

where m' is the marginal import coefficient, x' is the marginal export coefficient, and $Y_t = I_t/cr$, then the foreign borrowing requirement in time t to achieve the target rate of growth is:

$$\begin{aligned} F_t = {} & m_a Y_0 + m'(Y_t - Y_0) - x_a Y_0 \\ & - x'(Y_t - Y_0) \end{aligned} \qquad (14.17)$$

Subtracting (14.14) from (14.17) gives:

$$F_t - F_0 = \Delta M - \Delta X$$

i.e. increments in external assistance finance the difference between imports to sustain the target rate of growth and the increment of exports. If the level of foreign assistance is to decline over time (i.e. $F_t < F_0$), x' must be greater than m'.

An alternative approach is to express the minimum import requirement for growth as a proportion of investment requirements, in which case, from (14.5), we have:

$$M_t = m_i I_t = m_i Y_t cr \qquad (14.18)$$

where m_i is the import–investment coefficient.

The condition that $F_t = M_t - X_t$ gives:

$$Y_t m_i cr = X_t + F_t \qquad (14.19)$$

and the trade-limited growth rate is then

$$r = \frac{1}{m_i c}\left(\frac{X_t}{Y_t} + \frac{F_t}{Y_t}\right) \qquad (14.20)$$

The export–import gap will become less and less restrictive as time goes on, provided exports increase at a faster rate than national income (i.e. if $x' > x_a$), and/or if m_i falls, which is likely as more and more capital goods are produced domestically.

With respect to policy, the analysis highlights the importance of a greater proportion of resources devoted to exports. The M–X gap will only disappear, and trade-limited growth come to an end, when exports rise to a level sufficient to meet the import requirements of the target rate of growth set. One of the preconditions of an end to reliance on foreign borrowing to finance development, and to pay off past debts, is that a balance-of-payments deficit be turned into a continuing surplus through structural change or price and income adjustment mechanisms internally.

A Practical Case Study of Dual-Gap Analysis

Let us now give a practical example of how dual-gap analysis may be done with reference to the Sudan (see El Shibley and Thirlwall (1981). We shall be applying equation (14.1) (see also (14.4) and (14.5)) to estimate the investment–savings gap, and equation (14.2) (see also (14.15) and (14.16)) to estimate the import–export gap. The target rate of growth (r) set by the Sudanese 6-year plan 1977–8 to 1982–3 was 7.5 per cent per

Table 14.1 *Estimates of the Investment–Saving and Import–Export Gaps Assuming a 7.5 Per Cent Growth of GDP, 1977–8 to 1982–3 (£s million)*

	Y_0 Base year 1976–77	Y_1 1977–78	Y_2 1978–79	Y_3 1979–80	Y_4 1980–81	Y_5 1981–82	Y_6 1982–83
GDP	1822	1958.7	2105.5	2263.4	2433.2	2615.7	2811.8
Savings	155	172.9	185.3	198.6	212.9	228.2	244.7
Investment	319	440.7	473.7	509.3	547.4	588.5	632.7
Investment–savings gap	164	267.8	288.4	310.7	334.5	360.3	388.0
Exports	214	228.2	243.3	259.9	276.5	294.9	314.4
Imports	378	506.5	544.5	585.3	629.2	676.4	727.1
Import–export gap	164	278.3	301.2	325.4	352.7	381.5	412.7

annum. The assumed capital–output ratio is 3, so that investment requirements in time t may be written as:

$$I_t = crY_t = (3)(0.075)Y_t$$

A savings function was estimated of the form:

$$S_t = 8.5 + 0.084(Y_t)$$

Thus, given the target level of income, $Y_t (t = 1$ to $6)$, from applying the target rate of growth to the base year level of income (Y_0), the I–S gap can be estimated for each year in the future. The results are shown in **Table 14.1.** All values are in Sudanese pounds at constant (1976) prices.

For import requirements, the historical incremental output–import ratio (m') was taken of 0.29. Therefore:

$$M_t = \frac{r}{m'} Y_t = \frac{0.075}{0.29} Y_t$$

Exports in time t were calculated on the basis of an exponential trend rate of growth of 6.4 per cent per annum, i.e.

$$X_t = X_0 e^{0.064\,t}$$

The calculated import–export gap is also shown in **Table 14.1.** The results indicate that while, *ex post*, the two gaps were equal in the 1976–7 base year from the national accounts, the forecast gaps, *ex ante*, diverge through time, with the import–export gap dominant. For the target rate of growth to be achieved there would have to be foreign borrowing each year to fill the biggest of the two gaps. The analysis here is brief and mechanistic, but it illustrates the principle and what can be done in a simple way as a first approach.

The Assumptions of Dual-Gap Analysis

The basic underlying assumption of dual-gap analysis is a lack of substitutability between foreign and domestic resources. This may seem a stringent assumption, but nonetheless may be valid particularly in the short period.[1] If foreign exchange is scarce, it is not easy in the short run to use domestic resources to earn more foreign exchange, or to save foreign exchange by dispensing with imports. If it were easy, the question might well be posed: why do most developing countries suffer chronic balance-of-payments deficits over long periods despite vast reserves of unemployed resources? If domestic saving is scarce, it is probably easier to find ways of using foreign exchange to substitute, raising the domestic savings ratio and the productivity of capital. The Arab oil-producing countries are prime examples of countries with a surplus of foreign exchange and a dominant investment–savings gap which use their foreign exchange to buy imported capital equipment and manpower. In most, if not all, the oil producing countries, there is a **skill constraint** that binds, which prevents the full utilisation of foreign resources available.

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[1] If there was complete substitutability between imports and domestic resources, any surplus of domestic resources could be immediately converted into foreign exchange, and any surplus of foreign exchange could be immediately converted into domestic resources, and there could only be one gap, *ex ante*, as well as *ex post*. For a lucid discussion of the assumptions and limitations of dual-gap analysis, see Joshi (1970).

The pioneering studies of dual-gap analysis were undertaken by Professor Chenery and collaborators.[1] Of the countries that were studied the typical sequence seemed to be an investment–savings gap followed by an import–export gap in the 'take-off' stage of development, sometimes of considerable stubborness. In the past, before the oil price increases in 1973 and 1979, there was no tendency for one gap to predominate as the major constraint, taking the developing countries as a whole. A study of UNCTAD in 1968 of forty developing market economies (UNCTAD (1968)) found no significant difference between the investment–saving gap and import–export gap for the countries as a whole, and forecast a need for foreign borrowing of $24 000 million for 1975 on the assumption of 6 per cent growth. All these calculations, however, were subsequently upset, and now almost every non-oil producing developing country is confronted with a dominant foreign exchange gap. How temporary or permanent this dominant constraint will be must be a matter of conjecture depending on the future price of oil, the future export performance of developing countries and their ability to generate domestic saving.

Models of Capital Imports and Growth

It has been established that capital imports can raise the growth rate, but we have not considered how capital imports are financed and how the terms of borrowing may affect the growth rate. A model which incorporates these considerations is developed below. It is shown that: (i) **the rate of growth of output** will be faster with capital imports provided new inflows of foreign capital exceed the loss of domestic saving to pay interest – if, however, interest charges are met by new borrowing, capital imports must always have a favourable effect on the growth rate of output; and (ii) **the rate of growth of income** will be faster as long as the productivity of capital imports exceeds the rate of interest. The model is as follows:[2]

$$\text{Let } O = Y + rD \tag{14.21}$$

where O is output, Y is income, r is the interest rate, and D is debt. The difference between domestic output and national income is factor payments abroad. From equation (14.21) we have:

$$\Delta O = \Delta Y + r\Delta D \tag{14.22}$$

Now

$$\Delta O = \sigma I \tag{14.23}$$

where σ is the productivity of capital, and

$$I = sO + \Delta D - srD \tag{14.24}$$

where s is the propensity to save. Substituting equation (14.24) into (14.23) and dividing by O gives an expression for output growth of:

$$\frac{\Delta O}{O} = \sigma\left(s + \frac{\Delta D - srD}{O}\right) \tag{14.25}$$

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[1] See, e.g., Chenery and Bruno (1962); Chenery and Adelman (1966); Chenery and Macewan (1966); Chenery and Strout (1966).

[2] The model results from the outcome of a debate between Ball and Massell. See Ball (1962) and Massell (1964).

Equation (14.25) shows that the growth of output will be higher than the rate obtainable from domestic saving alone as long as $\Delta D > srD$, that is as long as new inflows of capital exceed the amount of outflow on past loans that would otherwise have been saved. This is a fairly stringent condition unless it is assumed that the interest payments due are met by creating new debt. It can be seen from equation (14.25) that if $rD = \Delta D$, the rate of growth of output with capital imports will always be higher than without capital imports as long as $s < 1$ (which is the normal case to consider). It may be concluded, then, that if interest payments on past loans can be borrowed in perpetuity, there is a permanent gain to be had from running an import surplus. In practice, however, a country that continually rescheduled its debts might ultimately be classified by the international community as uncreditworthy and therefore not be able to borrow continually.

Now let us consider the rate of growth of income as the dependent variable. From (14.21)

$$\Delta Y = \Delta O - r\Delta D \qquad (14.26)$$

Substituting (14.24) into (14.23) and the result into (14.26) gives:

$$\Delta Y = \sigma(sO + \Delta D - srD) - r\Delta D \qquad (14.27)$$

Now since $Y = O - rD$, we can also write (14.27) as:

$$\Delta Y = \sigma sY + \Delta D(\sigma - r) \qquad (14.28)$$

and dividing through by Y we have an expression for the rate of growth of income of:

$$\frac{\Delta Y}{Y} = \sigma s + (\sigma - r)\frac{\Delta D}{Y} \qquad (14.29)$$

Equation (14.29) shows that the growth rate of income with capital imports will be higher than that obtained from domestic saving alone as long as the productivity of capital imports (σ) exceeds the rate of interest on foreign borrowing (r). This is a standard result showing that investment is profitable as long as the rate of return exceeds the rate of interest. In some circumstances, however, this condition may be a fairly stringent one also.

Capital Imports, Domestic Saving and the Capital–Output Ratio

From the discussion above it would appear that import surpluses have great potential in the development process. It is sometimes argued, however, that import surpluses financed by foreign capital inflows increase the capital–output ratio (i.e. reduce the productivity of capital) and discourage domestic saving; in addition, that a large fraction of capital inflows is consumed rather than invested. The net result may be no extra growth at all or that the growth rate is even reduced.[1] In terms of equation (14.25) and (14.29), the inflow of capital ΔD may reduce s and σ and only a fraction of ΔD may be invested.

As far as the relation between capital imports and domestic saving is concerned, many studies find a negative relation. Care must be taken in interpreting the relationship, however, because, owing to the way saving is defined, a negative relationship is bound to be found as long as a proportion of capital imports is consumed. As we said before, domestic saving is normally defined in developing countries as investment minus foreign capital inflows: $S = I - F$. If F rises, and I rises by less than F, S must fall for the equality to hold. Thus a negative statistical relationship between foreign capital inflows and domestic saving cannot necessarily be interpreted as a weakening of the development effort; it may simply reflect the fact that a proportion of capital inflows is consumed. The important point is that no studies find a negative relation between capital inflows and the investment ratio. This means that capital inflows must finance some additional growth unless the productivity of capital falls drastically.

Griffin argues that foreign capital inflows do lower the productivity of capital and raise the capital–output ratio because of the tendency for international assistance to be used for prestige projects and because of a bias towards the use of international resource flows for infrastructure projects and social-overhead capital. It should be remembered, however, that there is an important distinction to be made between the capital–output ratio of a particular project on the one hand and the capital–output ratio for the economy as a whole, which is the ratio relevant to the model. It would be quite possible for the overall capital–output ratio to fall even though projects financed by capital inflows were relatively capital-intensive. This could happen in at least two ways. First, the greater availability of foreign exchange could enable a more productive use to be made of capital resources as a whole, e.g. if output is depressed because foreign exchange is the dominant constraint. Capital inflows also allow a change in the product-mix towards more labour-intensive commodities which can reduce the overall capital–output ratio of the economy. The second point is that the particular projects undertaken could have external effects on the output of other sectors. This is the 'externalities' argument for the public provision of infrastructure projects which themselves may have very high capital–output ratios. There is no convincing evidence that countries with a high ratio of capital inflows to national income have a higher capital–output ratio than other countries, and there is no convincing evidence that the productivity of foreign resource inflows is lower than the productivity of domestic savings. On the contrary, the evidence we have from the studies of Papanek (1973) and Pesmazoglu (1972) is that foreign capital inflows are more productive than domestic resources.

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[1] This argument has been put forward notably by Griffin (1970), and has since been the subject of continual scrutiny. For the latest evidence, see the survey by White (1992).

The Balance of Payments, Foreign Borrowing and the Debt Burden

It is instructive to examine the balance of payments deficits of the non-oil-developing countries, and the methods of financing them. Naturally, all accounting figures are *ex post* and therefore give no measure of the magnitude of the foreign exchange gap on current account had the countries been willing and able to finance larger deficits at higher levels of economic activity. Undoubtedly, the deficits would have been larger post-1973 and post-1979 had not some adjustment, as well as financing, taken place to accomodate the massive increase in the price of oil in those years. Even so, the deficits have been huge by any standards, reaching a peak of over $100 billion in 1981. Had borrowing not been undertaken the adjustment required could have precipitated a world recession more severe than the great depression of the 1930s.

Table 14.2 shows the deficit on current account, and the methods of financing it, for the developing countries in more recent years (excluding Eastern Europe and the former USSR). The deficit fell from its peak of over $100 billion in 1981 to $17.6 billion in 1987, and then rose again. In the 1980s, there was a colossal outflow of debt service payments averaging over $80 billion per annum, itself a function and reflection of past capital inflows. The *net* deficit on service payments and private transfers accounted for more than one-third of the total current account deficit.

Table 14.2 gives the four major categories of balance-of-payments financing: non-debt-creating flows (including direct private investment); asset transactions (including export credits); the use of foreign exchange reserves; and net external borrowing (mainly from the private banking system). Since the mid-1980s, non-debt-creating flows have shown a trend increase. Direct private investment does not create debt, but it gives rise to future foreign exchange outflows if profits are repatriated. The total of non-debt-creating flows was $26.7 billion in 1991. There was also a trend increase in net external borrowing from the mid-1980s, rising to $85.7 billion in 1991. This mainly reflects the recovery of bank lending, following the cut-back in the early 1980s in the wake of the debt crisis. International reserves have also been heavily used as a means of balance-of-payments support.

In 1991, the current value of outstanding debt

Table 14.2 ***The Balance of Payments of Developing Countries and Methods of Financing 1984–91 ($US billion)***

	1984	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*	*1991*
Developing countries excluding Eastern Europe and former USSR								
Deficit on goods, services, and private transfers[1]	41.4	38.3	61.1	17.6	38.1	35.1	24.8	85.4
Non-debt-creating flows, net	21.2	32.2	28.3	37.9	33.0	33.9	42.1	26.7
Official transfers	9.7	13.4	14.7	13.7	15.7	16.7	16.8	0.6
Direct investment, net	13.5	11.0	11.0	15.4	16.5	17.7	19.8	25.1
SDR allocation, gold monetization, and valuation changes	–2.0	7.7	2.5	8.8	0.9	–0.5	5.5	1.0
Asset transactions, net[2]	–11.7	–10.1	–13.0	–5.3	–22.4	–17.4	–27.3	18.9
Net errors and omissions[3]	2.9	5.3	6.3	3.6	1.3	5.0	–1.1	–1.1
Use of reserves	–9.4	–15.9	–7.9	–54.4	4.6	–19.7	–51.9	–45.6
Net external borrowing	38.4	26.8	47.4	35.7	21.5	33.3	62.9	86.4
Reserve-related liabilities	4.1	1.8	–1.6	–4.2	–2.4	–0.6	–6.0	0.7
Net credit from IMF[4]	4.2	0.3	–2.2	–4.7	–4.1	–1.5	–1.9	1.1
Liabilities constituting foreign authorities' reserves[5]	–0.1	1.5	0.6	0.5	1.7	1.0	–4.1	–0.4
Other net external borrowing[6]	34.3	25.0	49.1	39.9	24.0	33.9	68.9	85.7

Note: Except where footnoted, estimates are based on national balance of payments statistics. These flows are not always reconcilable with year-to-year changes in either debtor- or creditor-reported debt statistics, in part because the latter are affected by changes in valuation.

[1] Equivalent to current account deficit less official transfers. Official transfers are treated in this table as external financing.

[2] Pertains to export credit, recorded changes in private foreign assets, and collateral for debt-reduction operations.

[3] Positioned here on the presumption that estimates reflect primarily unrecorded capital outflows.

[4] Includes use of Fund credit under the General Resources Account, Trust Fund, structural adjustment facility, and enhanced structural adjustment facility.

[5] Comprises short-term borrowing by monetary authorities from other monetary authorities.

[6] Residually calculated. Except for discrepancies in coverage, amounts shown reflect net external borrowing from official and private creditors as well as short-term flows.

Source: *World Economic Outlook*, May 1992 (IMF).

was of the order of $1300 billion, and debt service payments amounted to $150 billion, comprising $80 billion repayment of principal (amortisation) and $70 billion payment of interest. In many countries in the 1980s, debt-service payments exceeded the value of new gross capital inflows making them net *exporters* of capital. Payments on past debts also absorb a high proportion of foreign exchange earnings from exports, typically in the region of 20 to 50 per cent, depending on the country. A summary of outstanding debt and debt-service payments of the developing countries from 1970 to 1990 is given in **Table 14.3**, and the outstanding external debt of individual countries is given in **Table 14.4**.

■ The Debt Service Problem

The fact that the rate of return on investment in the borrowing country exceeds the rate of interest is no indication of whether the debt can be serviced since the loan must be repaid with interest in *foreign* currency. Thus the questions of the pro-

Table 14.3 ***Summary of Outstanding Debt and Debt Service Payments of Capital Importing Developing Countries 1970 to 1990***

	1980	*1986*	*1990*
Total debt ($ US billion)	572.7	1062.2	1280.5
Debt–export ratio (%)	131	236	177
Debt–GDP ratio (%)	28	50	42
Interest payments	47.0	64.7	63.4
Principal repayments	45.0	70.2	79.9
Debt service ratio	21.1	30.0	19.8

Source: *World Debt Tables 1991–92, Vol. I. Analysis and Summary Tables* (World Bank, 1992).

fitability of borrowing and of the capacity to service debt are conceptually distinct. The ability to service debt depends on whether additional foreign exchange can be earned or saved by the borrowing. This depends on the domestic economic policy pursued by the country concerned, and on the *ability* to export which depends to a large extent on world economic conditions. A major part of the debt-servicing difficulties that have arisen in recent years has more to do with changes in world economic conditions which depressed the foreign exchange earnings of developing countries in the first half of the 1980s than with the miscalculation of rates of return on investment, the misuse of investment funds, or the use of capital inflows to

Table 14.4 ***Total External Public and Private Debt and Debt Service Ratios***

		Total external debt as a percentage of		
	Total external debt (millions of dollars)	*Exports of goods and services*	*GNP*	*Total debt service as a percentage of exports of goods and services*
	1990	*1990*	*1990*	*1990*
Low-income economies		**218.5 *w***	**41.0 *w***	**20.1 *w***
China and India		**132.3 *w***	**19.0 *w***	**15.3 *w***
Other low-income		**306.5 *w***	**82.6 *w***	**24.9 *w***
Mozambique	4 718	1 573.3	384.5	14.4
Tanzania	5 866	1 070.7	282.0	25.8
Ethiopia	3 250	480.3	54.2	33.0
Somalia	2 350	2 576.2	276.9	11.7
Nepal	1 621	402.6	53.0	18.2
Chad	492	207.1	44.8	5.1
Bhutan	83	81.9	32.3	6.8
Lao PDR	1 063	1 113.5	123.3	12.1
Malawi	1 544	328.5	85.6	22.5
Bangladesh	12 245	448.2	53.8	25.4
Burundi	906	930.1	83.2	43.6
Zaire	10 115	438.0	141.0	15.4
Uganda	2 726	1 175.2	92.1	54.5
Madagascar	3 938	805.5	134.1	47.2
Sierra Leone	1 189	773.7	146.2	15.9
Mali	2 433	433.4	100.7	11.5
Nigeria	36 068	242.7	110.9	20.3

Table 14.4 ***Total External Public and Private Debt and Debt Service Ratios (continued)***

	Total external debt (millions of dollars)	*Total external debt as a percentage of*		*Total debt service as a percentage of exports of goods and services*
		Exports of goods and services	*GNP*	
	1990	*1990*	*1990*	*1990*
Niger	1 829	464.2	73.6	24.1
Rwanda	741	494.1	35.0	14.5
Burkina Faso	834	156.0	26.4	6.4
India	70 115	282.4	25.0	28.8
Benin	1 427	316.9	. .	3.4
China	52 555	77.4	14.4	10.3
Haiti	874	258.4	36.1	9.5
Kenya	6 840	306.3	81.2	33.8
Pakistan	20 683	249.6	52.1	22.8
Ghana	3 498	353.4	56.8	34.9
Central African Rep.	901	400.7	70.6	11.9
Togo	1 296	212.2	81.8	14.1
Zambia	7 223	500.8	261.3	12.3
Guinea	2 497	287.1	97.6	8.3
Sri Lanka	5 851	209.8	73.2	13.8
Mauritania	2 227	449.8	226.6	13.9
Lesotho	390	41.2	39.6	2.4
Indonesia	67 908	229.4	66.4	30.9
Honduras	3 480	322.2	140.9	40.0
Egypt, Arab Rep.	39 885	300.8	126.5	25.7
Liberia	1 870	. .	. .	. .
Myanmar	4 675	. .	. .	. .
Sudan	15 383	1 829.1	. .	5.8
Middle-income economies		**155.6 *w***	**39.9 *w***	**19.1 *w***
Lower-middle-income		**179.0 *w***	**53.3 *w***	**20.3 *w***
Bolivia	4 276	428.7	100.9	39.8
Zimbabwe	3 199	155.0	54.1	22.6
Senegal	3 745	236.8	66.5	20.4
Philippines	30 456	229.2	69.3	21.2
Côte d'Ivoire	17 956	487.4	204.8	38.6
Dominican Rep.	4 400	188.7	63.3	10.3
Papua New Guinea	2 606	168.6	83.9	36.0
Guatemala	2 777	175.2	37.5	13.3
Morocco	23 524	282.5	97.1	23.4
Cameroon	6 023	257.6	56.8	21.5

Table 14.4 ***Total External Public and Private Debt and Debt Service Ratios (continued)***

	Total external debt (millions of dollars)	*Total external debt as a percentage of*		*Total debt service as a percentage of exports of goods and services*
		Exports of goods and services	*GNP*	
	1990	*1990*	*1990*	*1990*
Ecuador	12 105	371.8	120.6	33.2
Syrian Arab Rep.	16 446	301.2	118.1	26.9
Congo	5 118	352.5	203.6	20.7
El Salvador	2 133	170.8	40.4	17.1
Paraguay	2 131	112.3	40.5	11.0
Peru	21 105	488.3	58.7	11.0
Jordan	7 678	249.2	221.1	23.0
Colombia	17 241	183.4	44.5	38.9
Thailand	25 868	82.0	32.6	17.2
Tunisia	7 534	127.7	62.2	25.8
Jamaica	4 598	202.6	132.0	31.0
Turkey	49 149	195.0	46.1	28.2
Romania	369	5.5	1.1	0.4
Poland	49 386	251.5	82.0	4.9
Panama	6 676	126.5	154.7	4.3
Costa Rica	3 772	184.2	69.9	24.5
Chile	19 114	181.3	73.5	25.9
Botswana	516	22.9	20.6	4.4
Algeria	26 806	193.0	53.1	59.4
Bulgaria	10 927	135.9	56.9	16.7
Mauritius	939	53.5	37.9	8.7
Malaysia	19 502	55.9	48.0	11.7
Argentina	61 144	405.6	61.7	34.1
Iran, Islamic Rep.	9 021	48.2	7.6	3.5
Angola	7 710	. .	. .	. .
Lebanon	1 932	. .	. .	. .
Nicaragua	10 497	2 728.6	. .	4.1
Yemen, Rep.	6 236	214.2	97.1	5.4
Upper-middle-income		**132.1** *w*	**29.8** *w*	**17.9** *w*
Mexico	96 810	222.0	42.1	27.8
South Africa	. .	. .	. .	. .
Venezuela	33 305	158.7	71.0	20.7
Uruguay	3 707	155.9	46.9	41.0
Brazil	116 173	326.8	25.1	20.8

Table 14.4 ***Total External Public and Private Debt and Debt Service Ratios (continued)***

	Total external debt (millions of dollars)	*Total external debt as a percentage of*		*Total debt service as a percentage of exports of goods and services*
		Exports of goods and services	*GNP*	
	1990	*1990*	*1990*	*1990*
Hungary	21 316	188.6	67.8	37.9
Yugoslavia	20 690	67.1	23.7	13.7
Czechoslovakia	8 231	55.6	18.6	10.4
Gabon	3 647	138.4	86.2	7.6
Trinidad and Tobago	2 307	99.4	50.8	14.5
Portugal	20 413	75.4	36.5	17.8
Korea, Rep.	34 014	44.0	14.4	10.7
Oman	2 484	42.1	. .	13.0
Low- and middle-income		**171.3 *w***	**40.2 *w***	**19.4 *w***
Sub-Saharan Africa		**324.3 *w***	**109.4 *w***	**19.3 *w***
East Asia & Pacific		**91.1 *w***	**26.9 *w***	**14.6 *w***
South Asia		**281.5 *w***	**30.7 *w***	**25.9 *w***
Europe		**125.7 *w***	**41.0 *w***	**16.9 *w***
Middle East & N. Africa		**180.3 *w***	**52.6 *w***	**24.4 *w***
Latin America & Caribbean		**257.4 *w***	**41.6 *w***	**25.0 *w***
Other economies		. .	. .	. .
Severely indebted		**273.8 *w***	**46.4 *w***	**25.3 *w***

w stands for weighted average
Source:. *World Development Report* 1992.

raise present consumption. There was a parallel in the 1980s with the great depression of the 1930s when the collapse of the world price of key commodities, and a general shrinkage of world trade, caused major debt defaults (which subsequently dried up the flow of private capital to developing countries for the next forty years). The trouble started in 1982 when world trade volume shrank by 2.5 per cent, and the terms of trade for developing countries as a whole deteriorated by over 10 per cent. Not even the most prudent borrower or cautious lender can foresee such events which may occur half-way through the life of a loan commitment entered into under quite different economic circumstances. Lenders and borrowers can allow for risk – that is, the statistical probability that the expected outcome will not materialise – but what happened in the world economy in 1980s was a whole shift in the probability distribution of outcomes which cannot be insured against. When such unforeseen events occur, beyond the borrower's control, which make it difficult for loans to be repaid and serviced without severe economic disruption, two questions arise: what is the optimal degree of debt rescheduling, and who should bear the cost? It is naturally in the interests of private banks that loans be repaid on schedule, but it is not necessarily in the global interest if this leads to a contraction of imports by the borrowing country which then reduces the exports of other countries, leading to a deflationary spiral in the whole world economy. If there is a divergence between the private and social interest, this would seem to call for an international subsidy for lenders and borrowers to accept more rescheduling. The solution so far has been to require the debtor countries to accept adjustment and rescheduling with very little subsidy at all. If the international economy derives a benefit from rescheduling, however, why should the poor debtor countries bear the full cost? There is a great source of international inequality here, particularly when it was largely the deflationary policies pursued by the lender countries which caused the servicing of debt to become so problematic in the first place.

The benefits of borrowing to individual countries, and to the world economy at large, are clear. But how far should borrowing go? Is it possible that after a certain point, even though a developing country still requires resources for development, the disadvantages of further borrowing outweigh the advantages? Unfortunately there are no precise objective criteria that can be laid down to answer this question. If a country has an intertemporal budget constraint, so that no creditor is to be left unpaid over time, clearly trade surpluses and deficits must balance over the long run, and the question is not *whether* to borrow but *when*. The optimal timing of deficits will depend on current and future conditions in the economy. As far as borrowing for consumption is concerned, to smooth out consumption over time, the relation between the market rate of interest and the rate of time preference is important. As far as borrowing for investment is concerned, the relation between the rate of interest and the productivity of investment is important. But suppose there is not an intertemporal constraint, and countries can borrow in perpetuity, how then should the problem be formulated? And what about the fact that countries must service and repay debt in foreign currency?[1]

Most of the criteria for the evaluation of optimal borrowing relate to the proneness to default which may impair future borrowing capacity. This makes sense, since if it wasn't for the possibility of mortgaging the future, default would be the optimal strategy from the borrower's point of view: borrow as much as possible and delay repayment indefinitely! Debt as a proportion of national income is sometimes taken as a criterion. This proportion depends not only on the interest rate on loans but also on the relation between the average and marginal savings ratio. Consider two extremes. At one extreme savings equals required investment so that the debt increases at a rate equal to the rate of interest, and if the interest rate exceeds the rate of growth of income debt as a proportion of income will rise. At the other extreme savings exceed investment by just enough to meet interest payments on past debt so that there is no increase in net indebtedness. Between these two extremes, given the size of the debt relative to national income, and a marginal savings rate greater than the investment ratio, there will be some rate of interest such that debt will increase at the same rate as the national income. Assuming no debt at the beginning of the period this critical interest rate can be shown (see Hayes (1964)) to be a function of the initial and marginal savings ratio, the capital–output ratio and the desired growth rate, in the formula:

$$i = \frac{r(s_O - s')}{s_O - cr} \tag{14.30}$$

where r is the desired growth rate, s_O is the initial savings ratio, c is the capital–output ratio, and s' is the marginal savings ratio. If the critical rate of interest is exceeded the debt could well become unmanageable, in the sense of being unserviceable by further borrowing. Foreign capital may dry up and creditors may be forced to expropriate assets. There has been a progressive rise in the ratio of debt to the GDP of developing countries from approximately 20 per cent in the early 1970s to over 40 per cent in 1990, but it is not clear what economic significance should be attached to this ratio as a measure of the ability to service debt and therefore as a measure of the possibility of default. It is true that to service the debt export earnings as a proportion of national income should rise, but this suggests a more direct measure of the proneness to default relating debt-service payments to

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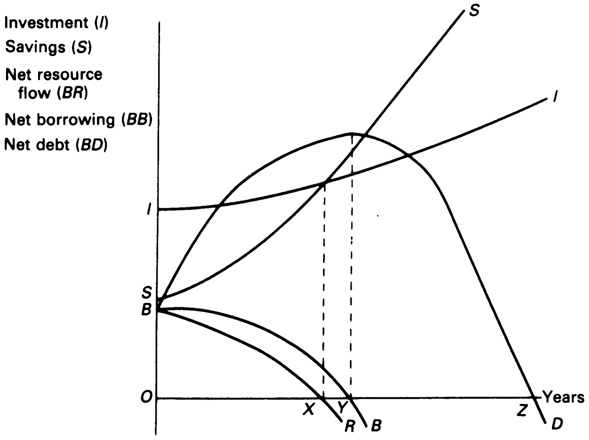
[1] For a useful survey of the literature on optimal borrowing and debt capacity, see McDonald (1982).

Figure 14.1



exports. Indeed, by far the most widely used criterion for assessing the desirability of future borrowing and proneness to default is the **debt–service ratio** which measures the ratio of amortisation and interest payments to export earnings. While it is not possible to fix a limit to the debt–service ratio that should not be exceeded (because other factors also matter), a progressively rising ratio means a greater fixed claim on export receipts, and therefore the greater the proneness to default if these receipts fluctuate and foreign exchange requirements for other purposes cannot easily be curtailed. For all developing countries the debt–service ratio rose from 15 per cent in the early 1970s to 25 per cent in the mid-1980s, and falling to 20 per cent in 1990. In some countries, however (see **Table 14.4**) the ratio exceeds 30 per cent.

The debt-servicing implications of borrowing can be integrated nicely with dual-gap analysis by means of a simple diagram showing the time sequence of the investment–savings, or import–export, gap against net resource flows, net borrowing and net indebtedness. An understanding of the interrelationships can be obtained from **Figure 14.1** without a numerical example. We shall illustrate with reference to the *I–S* gap, but the analysis is exactly analogous in the case of the *M–X* gap. The investment–saving gap is given by the difference between the curves *II* and *SS*. The net resource flow (*BR*) required to bridge the investment–savings gap to maintain a target rate of growth declines steadily, becoming a net resource outflow after *OX* years. Net borrowing goes on a little longer in order to cover interest charges on accumulated indebtedness. Net borrowing (*BB*) is zero after *OY* years and at this point net indebtedness (*BD*) starts to decline. Debt repayments, in theory, take place by converting the excess of savings over investment into a balance-of-payments surplus until all indebtedness is repaid by the year *Z*, after which the country becomes a net creditor.

This is a model sequence of events which has been approximated to by many of the now developed countries. In the case of most developing countries today, however, there is little evidence that they have the ability to pay off their past indebtedness and cut down on net resource inflows. The need for resources is as acute as ever and their indebtedness is mounting because an import–export gap has replaced the investment–savings gap.

Notwithstanding the attention paid to the debt–service ratio, it is not necessarily a good indicator of a country's ability to repay debts, nor is the debt–service ratio in practice the only good predictor of default. The ability to repay depends also on the ability to attract new capital and on the relation between foreign exchange earnings and necessary import requirements. Historically, countries such as Bolivia, Brazil, Colombia, Cuba, Peru and Uruguay defaulted between 1931 and 1933 with debt–service ratios of between 16 and 28 per cent, while Australia with a ratio of 45 per cent did not default. Proneness to default depends on a complex of factors, of which the debt–service ratio is just one. Feder and Just (1977) have identified six variables significantly affecting the probability of default: the debt–service ratio (+); *per capita* income (−); the ratio of net foreign capital inflows to debt–service payments (−); the growth of GDP *per capita* (−); export growth (−), and the ratio of imports to international reserve holdings (+). Frank and Cline in an early study of 'defaults' in the 1960s (which included 13 debt reschedulings in eight countries over nine years) chose eight indicators that they thought might be of importance, but found only three to be statistically significant: the debt–service ratio; the rate of amortisation of outstanding debt (the inverse of the average maturity of debt), and the ratio of imports to international reserves.[1]

■ The Debt Crisis of the 1980s[2]

The debt 'crisis' erupted in the summer of 1982 when Mexico suspended for the first time the repayment of loans due to the private banking system and sovereign lenders. The crisis has smouldered ever since with more and more countries finding it difficult to service accumulated debts out of foreign exchange earnings. In 1987, Brazil became the first country to suspend interest payments to foreign creditors.

The 'crisis' aspects of debt can be looked at from different standpoints: from the point of view of the individual borrowing countries, or the lenders (private and sovereign governments), or the whole world economy. As far as borrowers are concerned, there are basically two types of 'problem' countries. First, there are a small number of poor commodity dependent countries, mainly in Africa but also elsewhere, where private banks are not involved. It becomes a crisis for these countries if they have to cut back essential imports in order to service debt, but not a crisis for the banking system or for the world economy if they default. The absolute sums of money involved are relatively small and their future entitlement to official borrowing would probably not be jeopardised. The rescheduling of debt has already been undertaken in many cases. There have been over 80 reschedulings in Africa alone during the last ten years. The second set of countries comprises a few newly-industrialising countries, mainly in Latin America, who borrowed from the commercial banking system at floating rates of interest whose export markets then became depressed. The sums of money involved here are huge. Non-repayment of debt becomes a crisis for the private banking system (which in retrospect clearly over-extended itself), and a crisis for individual countries if the threat of default dries up the flow of new capital. There would also be a crisis for the world economy if there was a major default which led to a massive contraction of lending throughout the system; but this has not happened. Lending did contract sharply in the early 1980s but then rose again as difficulties were resolved by various forms of international co-operation.

The origin of the current debt difficulties of certain countries is no mystery. Massive balance-of-payments surpluses arose in the early 1970s in the oil-exporting countries with counterpart deficits elsewhere. The factors which caused the supply of capital to increase created its own demand. Private banks were anxious to on-lend and there was no shortage of demand. Demand was particularly strong because commodity prices were generally high, exports were buoyant, and inflation had reduced the real rate of interest on loans to virtually zero. Credit looked cheap and borrowers looked good risks from the lender's point of view. But these circumstances suddenly changed. Depression in the developed countries, mainly self-inflicted to reduce the rate of inflation, caused world commodity prices to tumble, exports to languish, and real interest rates to rise. On top of this nominal interest rates floated upwards and the dollar appreciated.

The characteristics of the current debt 'crisis' are shown in **Table 14.3**. Of the total outstanding debt of $1280 billion in 1990, long-term debt (of more than one year maturity) comprised $1047 billion. This compares with long-term debt of $61 billion in 1970 (before the oil crisis), and as little as $10 billion in 1956. The ratio of current external debt to export earnings is 177 per cent, and the ratio of debt to GDP is 42 per cent. Of the total long-term debt, over $600 billion is owed to private financial institutions. By region, over 30 per

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[1] Frank and Cline (1969). The eight indicators were: the debt-service ratio; export growth; the variability of export earnings; the ratio of unnecessary to necessary imports; the amortisation rate; the import ratio; the ratio of imports to reserves, and *per capita* income.

[2] Useful books on the 1980s debt crisis include: Cline (1984); Claudon (ed.) (1986); Lomax (1986); Lever and Huhne (1985); Griffith-Jones and Sunkel (1986).

Table 14.5 *The Sixteen Largest Debtor Countries*

	Debt outstanding, 1990		*Debt service, 1990 (US$ billions)*		*Debt indicators, 1990 (per cent)*	
Country	*Total (US$ b)*	*Total private sources (%)*	*Total*	*Interest*	*Debt/GNP 1990*	*Interest/exports, 1990*
Algeria	26.8	71.6	8.3	2.1	52.9	15.1
Argentina	61.1	76.9	5.1	2.8	61.7	18.4
Bolivia	4.3	15.3	0.4	0.2	101.0	15.9
Brazil	116.2	76.3	7.4	2.9	22.8	8.6
Bulgaria	10.9	99.1	1.3	0.5	56.9	6.4
Congo	5.1	37.2	0.3	0.2	203.6	9.3
Cote d'Ivoire	18.0	59.5	1.4	0.5	203.9	13.3
Ecuador	12.1	64.2	1.1	0.5	120.6	14.5
Mexico	96.8	69.8	12.1	7.3	42.1	16.7
Morocco	23.5	25.1	1.9	0.9	97.1	11.7
Nicaragua	10.5	36.8	0.0	0.0	. .	3.0
Nigeria	36.1	47.4	3.0	1.8	117.9	12.1
Peru	21.1	62.7	0.5	0.2	60.1	5.2
Poland	49.4	42.8	1.0	0.3	82.4	1.6
Syria	16.4	14.0	1.5	0.2	118.1	3.9
Venezuela	33.3	85.1	4.3	3.2	71.0	15.6

Source: *World Debt Tables*, World Bank, 1991–92 edn.

cent of the debt is held by Latin America with roughly equal proportions shared between Southern Africa, North Africa and the Middle East, East Asia and the Pacific, South Asia, and the Mediterranean countries. The sixteen most heavily indebted countries, listed in **Table 14.5**, account for over half of total debt and for nearly 90 per cent of debt owed to the private banking system.

The increase in the volume of debt and higher rates of interest in the early 1980s led to an increase in debt–service payments from $18 billion in 1973 to over $140 billion in 1990. Debt and interest rates grew rapidly till 1986 and then began to level off. The debt service ratio reached a peak of 30 per cent in 1986, and then fell to 19.8 per cent in 1990. This has partly been due to debt rescheduling, but mainly due to the increase in export earnings as the world economy recovered in the second half of the 1980s.

The world debt problem is a foreign exchange problem. It represents the inability of debtors to earn enough foreign exchange through exports to service foreign debts and to sustain the growth of output (which requires foreign exchange to pay for imports) at the same time. Either service payments have to be suspended or growth curtailed, or a combination of both. Unfortunately for the debtor countries, and indeed the whole world economy, it is the growth of living standards that has suffered. The indebted less-developed countries are stagnating under a total burden of debt which has now reached $1400 billion, with expected resource transfers to service the debt of over $100 billion per annum.

All this is part of the **transfer problem** analysed by Keynes in the 1920s in the wake of the controversy over the reparation payments imposed on Germany by the Treaty of Versailles in 1919 (Keynes (1919)). Keynes mocked the folly and futility of the whole exercise on the grounds that it would be likely to be self-defeating, and so it turned out to be. Similarly today, the attempt to extract such large transfers from Latin America and Africa is leading nowhere. The economies of Latin America and Africa slide further into chaos, and the poor in these continents become progressively poorer.

There are two aspects of the transfer problem. First there is the **budgetary problem** for governments of acquiring the domestic resources for the repayment of debt, and secondly the problem of turning the resources into foreign exchange – or the **'pure' transfer problem** as Keynes called it. The transfer burden is the export surplus that has to be generated to acquire the foreign exchange, plus the possibility of a deterioration in the terms of trade if, in order to sell more exports, prices must be reduced. Even if prices do fall there is still no guarantee that export earnings will increase if the quantity sold does not rise in proportion. In these circumstances, the transfer becomes impossible without a contraction of domestic output to compress imports. There is substantial evidence that the indebted countries collectively are caught in this trap, since for a large part of their trade they compete with each other; and competitive price reductions leaves total earnings unchanged. To date, it is the contraction of living standards that has generated the export surplus by reducing the import bill. That is no good for the developing countries, or for the health of the world economy.

The other side of the coin is that, if total trade is static, increased exports from debtors take markets away from domestic producers in other countries, and the extraction of the surplus from the debtors reduces welfare all round. This was one of Keynes's major objections to the excessive reparations imposed on Germany; that the transfer from Germany would be generated at the expense of the victors' industries.

History has lessons to teach. The magnitude of the transfer now expected from Latin America is, in fact, greater as a proportion of total output and trade than that imposed on Germany, and there is little sign of it easing. What we are witnessing in the world economy is a vast charade of money being recycled from creditors to debtors and back again to the creditors, while the total volume of debt grows and the pressure on debtor countries to adjust – a euphemism for deflation – increases.

Notwithstanding the huge debt burden of some countries, most observers agree that the debt problem is a liquidity problem, not one of insolvency. When debt-servicing difficulties began to emerge, the private banks increased the proportion of short- to long-term loans which exacerbated cash-flow problems with large amounts of short-term borrowing falling due for repayment within a year. If credit is further shortened or withheld entirely, a crisis then ensues. Such situations always pose a dilemma for banks. If they do withhold further credit, they contribute to default; if they continue to lend they expose themselves even more. Understandably there was greater paranoia in the United States than in Europe over the possibility of default since the US banks were much more exposed. Roughly 30 per cent of international lending by US banks was to developing countries, compared with only 20 per cent in Europe. In the early 1980s the nine largest US banks had an exposure to Brazil equal to 40 per cent of shareholders' capital; to Mexico 38 per cent and to Korea 19 per cent. If these debts had been written off a major part of the capital and reserves of the banking system would have been wiped out. With the intricate network of interbank lending that exists, there would have been the possibility of a chain of bank collapses. There is no lender of last resort in the United States. Moreover, private lending by US banks does not have the same degree of official guarantees as in Europe, where at least 30 per cent of lending is for export credits. It was not conceivable, however, that a major US bank would be allowed to collapse simply for want of a debt rescheduling agreement. Indeed, to date there have been no cases of default, and only a few cases of interest payment arrears. In most countries rescheduling arrangements have been satisfactorily concluded with the help of international consortia and the IMF. Up to now the so-called 'Paris Club' of creditor nations has adopted a case-by-case approach. At the international level emergency financing was made available under the auspices of the Bank for International Settlements, and in January 1983 the IMF established a Special Drawing Rights (SDR) 17 billion emergency fund under the General Agreement to Borrow (GAB).

The debt crisis of the early 1980s has subsided, but the debt-problem has not gone away. Donors have been as much responsible as borrowers. The developed countries must bear a major responsibility for the world recession of the 1980s, and private banks voluntarily over-extended themselves. Shared blame requires shared solutions.

■ Solutions to Debt Difficulties

Debt in many ways is like a cancer – once it gets a grip on a country it is very hard to eradicate, and may envelop every other organ of life, unless the rest of the economy can be reinforced to overcome it.

There are no easy solutions to the debt-servicing problem short of a massive programme of **debt forgiveness**, which leaves a manageable debt that the debtors can service. There has to be debt relief if there is to be any easing of the transfer burden. Further borrowing, without relief at the same time, increases debt service payments and simply makes matters worse, creating what might be called a **debt trap**. Since the lenders, the borrowers and the whole world community benefited from the debt-creation process, there is a strong case for saying that the same three parties should share the burden of relief. It is not fair that the debtor countries (the borrowers) should bear the whole of the adjustment burden. Up to now, the world community (including the creditor countries) has contributed virtually nothing to ease the plight of the debtors. There are three reasons why it should: first, the world community received an external benefit when the debt was created by the on-lending process in the 1970s, preventing output contraction in countries with balance-of-payments deficits, and thereby avoiding world slump; second, much of the debt problem arose in the first place through no fault of the contracting parties, but as a result of events in the world economy – rising oil prices, rising interest rates, world recession, falling commodity prices and so on; and thirdly because relief could actually confer a global benefit by easing the deflationary forces associated with the huge debt overhang.

As far as the private banks are concerned, they should take some losses for their imprudence, but there is clearly a limit to which they are able to provide debt forgiveness without jeopardising the net worth of the banking system. Apart from incentives that the banks themselves might have for writing down debt (for example, the hope of higher payments in the future), what is required is a form of creative accounting that writes down the debt and keeps banks solvent at the same time, with no real costs.

One such scheme would be for US banks to exchange debt for shares in the Federal Reserve, and for the Federal Reserve to sell debt to the government in exchange for government bonds. The government would then negotiate a forgiveness ratio with each debtor country. The interest payable to the Federal Reserve on the bonds would be returned to the US government as 'excess' income so that there would be no additional burden on the taxpayer (see Davidson (1992)). Another scheme would be for the Federal Reserve to supply dollars to the Central Banks of creditor countries to compensate the banks for write-offs. All these schemes would be merely book-keeping transfers without real costs, but with very real benefits to the debtors. Debt relief of at least $500 billion is required to leave a manageable debt for the debtors to service.

Apart from bold, imaginative, global schemes of debt relief, there are a number of piecemeal ways in which the present and future burden on the debtor developing countries could be ameliorated. This is how the debt problem has so far been handled – on a piecemeal, case-by-case basis.

□ *1. Debt Rescheduling*

The initial US response to the debt crisis was to attempt to increase **liquidity**, to give developing countries more breathing space to 'grow out' of their debt problems. This was the thinking behind the so-called **Baker Plan** of October 1988 which made provision for $20 billion of additional lending from the commercial banks and $9 billion of multilateral lending to the 15 or so most severely indebted countries, contingent on market-friendly, growth-oriented structural adjustment programmes being adopted. There was no acceptance of debt reduction by banks, and the sums of money were a drop in the ocean. In the event, most of the money was not lent because of the continued vulnerability of the banks and the deteriorating external situation.

The abortive Baker Plan was followed by the so-called **Brady Plan** of 1989 which did accept debt reduction, and has been more successful. The two main elements of the plan were the provision of funds via the IMF and World Bank for various forms of debt relief to middle-income debtor countries willing to adopt policy reforms, and secondly the encouragement to countries to buy back debt from banks at a discount thereby reducing future obligations. One possibility was for countries to swap old loans for new long-term (30-year) bonds at a discount of some 35 per cent with an interest rate only marginally above the market rate, and the bonds guaranteed by the IMF. To date, five major agreements of this type have been reached with Mexico, the Philippines, Costa Rica, Venezuela and Uruguay. The deal with Mexico has relieved it of $20 billion of debt service payments.

Other multilateral initiatives have focused on the poorest countries in debt. The governments of the OECD countries representing the so-called Paris Club adopted two major initiatives in 1988 and 1990 – the **Toronto Terms** (September 1988) and the **Trinidad Terms** (September 1990). These initiatives related to official debt (i.e. debt owed to governments) and first of all made provision for substantial cancellation of debt. For the remainder of the debt, substantial restructuring was offered. Under the Toronto terms, countries eligible were those receiving concessional assistance from the soft-loan affiliate of the World Bank, the International Development Association, and a distinction was made between official development assistance (ODA) and non-ODA. For ODA, countries were given 25 years to pay with a grace period of 14 years, with no change in the interest rate. For non-ODA, three options were offered of different combinations of rescheduling, relief and interest rates. Under the Trinidad terms, countries heavily in debt with a *per capita* income of less than $1195 were eligible. For ODA, countries were given 20 years to pay with a grace period of 10 years. For non-ODA, countries were given 15 years to pay with a grace period of 8 years and a market rate of interest.

Apart from these official initiatives, there has been a great deal of other debt rescheduling arranged privately between individual countries and the creditor banks. These ease the short-term pressure, but do not reduce future repayment obligations, unless the rescheduled debt is on softer terms.

☐ 2. *Debt Service Capping*

To avoid debt-service payments becoming excessive, several schemes have been suggested. One is for **variable maturity loans** to be issued so that debt-service payments remain unaltered as interest rates float upwards on private debt (rather like mortgage loans are variable in the housing market). Or maturities could be varied automatically to keep the **debt-service ratio** unchanged. This would accommodate fluctuations in foreign exchange receipts from exports as well. These schemes are equivalent to capitalising interest payments above a certain level. In 1985 Peru imposed unilaterally a 10 per cent ceiling on debt–service payments as a proportion of export earnings.

Another possibility is that **zero coupon bonds** might be offered which delay interest payments until the loan has matured. This would reduce the present value of interest payments, but more important, it would allow investment to be fully productive before there was any commitment of foreign exchange. It does not ensure, however, against the bunching of repayment commitments when foreign exchange earnings might be low.

☐ 3. *Debt Buy-Backs and Debt Swaps*

Another solution to the debt service problem, which has gained favour in recent years, is for countries to buy back their debt at a discount or to exchange the debt in various ways which fully or partially relieve the burden of interest and principal repayments. Third world debt trades in a secondary market, where some countries' debt can be bought at a discount of more than 50 per cent. At one time Sudanese debt could be bought in the secondary market for $2 per $100. If Sudan was able and willing to use its foreign exchange reserves to buy its own debt, it could have wiped out, say, $1 million of debt for as little as $20 000. The secondary market, however, is generally thin, and heavy buying is likely to raise the price considerably. Even so, the use of foreign exchange reserves to buy back debt at a discount of 20–30 per cent could make a useful contribution to debt relief.

Debt–Equity Swaps are a way of eliminating debt service payments altogether. A debt–equity swap involves the debt held by the creditor being converted into an equity stake in enterprises within the debtor country. The creditors have a claim on future profits, but the debtor countries are relieved of interest payments. Such swaps can be mutually profitable to all parties. A classic example was the Nissan motor company's purchase of Mexican debt for investment in its Mexican subsidiary in 1982. Nissan bought $60 million of Mexican debt held by the Citicorp bank at a price of $40 million – a discount of one-third. Nissan redeemed the debt certificates at the Mexican central bank for $54 million in Mexican pesos, which were then invested in its subsidiary. The Citibank unloaded its debt at the 'market' price; Nissan made a profit in dollars, and Mexico was relieved of interest payments in foreign currency. There have been several other debt–equity swaps since 1986, and increasingly they are being linked with privatisation programmes in the debtor countries, but the absolute magnitude of the sums involved are still relatively small in relation to the size of the debt burden.

Debt for Nature and Debt for Development Swaps. These work in the same way as debt–equity swaps, except the debt is bought by a governmental or charitable organisation and the proceeds are used for environmental or development purposes within the debtor country. The World Wide Fund for Nature has bought third world debt at a considerable discount and exchanged it for local currency for use on environmental projects within the developing countries. In 1988 UNICEF bought Sudanese debt from the Midland Bank and this was redeemed by the Sudanese government to finance water sanitation programmes in Central Sudan.

Debt for Bonds. Yet another swap scheme is for debtor countries to offer fixed-interest long-term bonds in exchange for debt held by the banks. They can be advantageous if the debt can be exchanged at a discount at a more favourable rate of interest. In 1988 Mexico launched a scheme offering $10 billion of bonds to its creditor banks, hoping to sell at a discount of 50 per cent. The sale turned out to be disappointing, however. Only 100 out of the 500 banks bid for the bonds, and the debt was discounted by only 30 per cent. Even so, some saving was made by the Mexican government. **Exit bonds** are a particular type of bond which give a bank a lower rate of interest than on the original debt, but end the banks' liability to provide new money. One way of encouraging this type of arrangement would be for the IMF to guarantee interest payments on the exit bonds which would encourage the banks to swap debt for this type of bond.

4. *Repayment of Loans in Local Currency*

There are also various schemes that would permit debtor countries to repay loans in local currency rather than foreign currency, which could become an instrument for trade promotion at the same time. An early proposal of this type was put forward by Khatkhate (1966). The essence of the scheme is that instead of developing countries repaying loans with interest to donor countries in scarce convertible currencies, they would service the debt by making payments in local currencies to regional development banks, which would then relend the local currencies to other developing countries for the purchase of exports from the debtor countries.

The developing countries which receive these exports would increase their liabilities to the creditor developed countries to the same extent as the debt liabilities of the developing countries which export these goods are reduced. As far as the creditor developed countries are concerned, it would mean that the repayments due to them from one debtor developing country would be re-lent immediately to another developing country, and so on. This process could continue until all the developing countries had built up their economies to such an extent that they are able to raise their exports to the developed countries and eventually to discharge their debt obligations to them. The proposal amounts to postponement of the retirement of debt to some indefinite date. Such a scheme is attractive on the surface, but has certain limitations. First, it must be recognised that the proposal amounts to a form of 'aid-tying' between the developing countries themselves, and the question must be asked; how many developing countries are there that can provide the sort of goods that other developing countries require for development purposes? On the other hand, trade between the developing countries is something to be encouraged, and this kind of scheme would provide a useful stimulus, and need not preclude the expansion of trade with the developed nations as well.

The feasibility of such a scheme would depend on the attitude of the creditor developed nations and of the multilateral aid-giving institutions such as the World Bank. The balance of payments of creditor countries would be affected adversely in at least two ways. First, the inflow of interest and amortisation payments from developing countries would cease (although interest would continue to accumulate to be paid at some future date). Secondly, exports to developing countries, financed by foreign assistance, would probably fall. The scheme would involve a balance-of-payments loss to developed countries unless gross aid is reduced. If so desired, however, the scheme would be a disguised way for governments to increase net aid. Since people in general appear to attach more importance to gross figures than to net figures, a government could achieve a net increase in the transfer of resources, without arousing public hostility, simply by maintaining its flow of gross aid.

Multilateral institutions would also suffer under the scheme through the non-repayment of loans. The proposal does not imply default, however, or writing-off interest payments. It involves a transfer of the debt liabilities that developing countries have to the World Bank to regional development banks. The World Bank could roll over its debt by new bond flotations, in the same way that a national government might fund its national debt.

A similar, but more restrictive, scheme would be arrangements whereby debtor countries could repay loans, particularly tied loans, in local currencies with the donors agreeing to buy the debtor's exports. This is sometimes called reciprocal tying, formerly practised by the centrally planned economies of Eastern Europe. It is particularly pernicious that loans should not only be tied to the donor's exports (see later) but should also have to be repaid in scarce foreign currency. A scheme of this type would be of considerable benefit to the foreign exchange reserves of the developing countries at little cost to the balance of payments of donor countries in the short run. In this respect the scheme has considerable advantage over the unilateral untying of assistance. The difficulty is the limited range of products produced by the developing countries which the developed countries would wish to buy.

☐ 5. Long-Term Solutions

On a longer-term basis, developed countries might set up machinery to guarantee loans from private sources (in addition to export credit guarantees) and establish a fund from which commercial interest rates might be subsidised. Such a scheme would mean that private lenders would not be deterred from lending through fear of default; developing countries would receive cheaper credit, and the donor's contribution in the form of payments to private lenders would not burden the balance of payments (if this was regarded as an obstacle to a higher level of *official* assistance).

Secondly, official development assistance might be given as grants rather than loans. The grant element of official assistance is already high, and this further step would not only give extra marginal help but would also avoid haggling over debt renegotiations if the need for rescheduling arose.

Finally, there is urgent need to devise schemes to stabilise the price or terms of trade of primary commodities. A large part of the 1980s debt crisis resulted from the collapse of primary product prices.

To stabilise the terms of trade, indexation may be appropriate for some commodities, for example, oil. For other primary commodities, credit creation to finance merchants' stocks would assist. Special Drawing Rights (see Chapter 16) might play a useful role here for buying up surplus stocks of primary commodities that are storable, or for income compensation for commodities that are not. It seems incredible that years on from Keynes's war-time plan for an international agency for stabilising commodity prices,[1] the world still lacks the requisite international agreement and institutional structures for greater stability and a fairer deal for developing countries that live by exporting primary commodities.

The Debate Over International Assistance to Developing Countries

As indicated above, capital flows to developing countries come in many different forms from grants or pure aid, to loans, to portfolio investment and direct investment by multinational companies. The magnitude of these various flows will be given later in the chapter. Donor countries and institutions provide aid, loans and investment, and the developing countries accept the flows, for a mixture of reasons. But the motives and the wider interests of the developing countries as a whole may not always coincide. The rationale and relevance of financial assistance to developing countries become very much a matter of subjective assessment, depending on the meaning and vision of the development process held by the protagonists. There is a substantial body of opinion on both the right and left of the political spectrum which argues that not only are financial resource transfers unnecessary for development, but may even be inimical to development by fostering dependence; weakening the domestic development effort, and leading to a distorted structure of consumption and production (as well as to the debt servicing problems – and profit outflows – already mentioned). These criticisms are levelled both at official assistance,[2] and at private investment, particularly at the activities of multinational companies (see, for example, Frank (1981)). We shall consider some of these concerns later, but first let us examine the motives for assistance and why developing countries accept the transfers.

The Motives for Official Assistance

There are several motives which inspire financial assistance from public bodies on concessionary terms, but they can be grouped under three headings.

1 There is the moral, humanitarian motive to assist poor countries, and particularly poor people in poor countries. The same arguments which provide the basis for income redistribution within nations can also be applied at the global level, namely that absolute poverty is intolerable and that if the marginal utility of income diminishes, total welfare will be increased by a redistribution of income from rich to poor. From a moral and welfare point of view, national boundaries are quite artificial constructions. Developing countries accept assistance with this concern in mind not only from national governments as part of their regular aid programme, but also from many voluntary and charitable organisations,

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[1] See Thirlwall (ed.) (1987). See Chapter 15 for partial schemes already in existence.

[2] See, for example, the work of Bauer (1971) and (1981); also Bauer and Yamey (1981).

and from emergency and disaster relief funds.

2 There are the political, military and historical motives for granting assistance. A large part of the American aid programme is designed as a bulwark against the spread of communism, and the regional and country distribution of assistance can only be satisfactorily explained in these terms. United Kingdom and French assistance tends to be concentrated on ex-colonial territories reflecting strong historical ties, and perhaps some recompense for former colonial neglect. Most developing countries are willing to accept assistance on this basis, as an aid to their development effort, particularly by governments threatened by hostile forces from within or without.

3 There are economic motives for developed countries investing in developing countries, not only to raise the growth rate of the developing countries, but also in their own self-interest to raise their own welfare, in which case international assistance can be mutually profitable. If the rate of interest on loans is higher than the productivity of capital in developed countries and lower than the productivity of capital in developing countries, both parties will gain. If there are under-utilised resources in developed countries, which could not otherwise be activated because of balance-of-payments constraints, international assistance will be mutually profitable through an addition to resources in developing countries and a fuller utilisation of resources in developed countries. This is the strong Keynesian argument for international assistance, also argued by the Brandt Report discussed in Chapter 1. Developing countries accept these financial flows because most are desperately short of foreign exchange (see Chapter 16), and judge the benefits of the programmes and the projects that they finance to be greater than the costs and any unfavourable side-effects.

The critics of official assistance dispute the alleged advantages of international assistance but weaken their case by confusing the operation of the system itself with its use as a potential instrument for the improvement of material well-being in less developed countries, and by arguing from the particular to the general case. For example, aid antagonists argue that assistance is maldistributed and does not reach the poorest people in the poorest countries. If true this would partly undermine the humanitarian objective of aid, but it is not a criticism of aid as such, but of its administration. Secondly, critics argue that assistance has not helped economic development. The evidence brought to bear on this contention is that many countries are still desperately poor after forty years of assistance, and that many parts of the Third World – in South East Asia, West Africa, and Latin America – made rapid progress long before the advent of official assistance. But clearly this is not conclusive evidence. In the first place, the *per capita* levels of annual assistance are trivial; in the second place, the countries might have been worse off without assistance, and thirdly, it cannot logically follow that because some countries progressed without official assistance that it is necessarily unproductive. The capital that went into South East Asia, West Africa and Latin America before the Second World War was commercial capital, but there is no reason for believing that official capital from bilateral or multilateral sources would have been any less productive.

The critics are on much stronger ground when they argue that international assistance may help to support governments which are pursuing policies that are obstructing development, and that by increasing the power of government, assistance breeds corruption, inefficiency and tensions in society which retard development. Assistance may also encourage irresponsible financial policies, and if the assistance is free (pure aid) there may be no incentive to use resources productively. There are elements of truth in these arguments, but it is not clear that the same policies would not be pursued without aid. Indeed, the alternatives might be worse, because with assistance comes a certain amount of 'leverage', which can be an influence for good as well as bad. Would the Tanzanian experiment of 'villagisation', which many would argue has undermined the performance of the economy, not have taken place without the government of Tanzania being in receipt of official assistance? It is doubtful; and paradoxically for the critics, it will probably be Western aid that comes to the rescue. It is also a paradox that the critics of official assistance, at least those on the political right, are generally supporters of governments that maintain inegalitarian structures which they claim assistance reinforces. A distinction also needs to be made in this argument between programme and project aid. Programme aid is much more open to abuse than supervised project aid whether free or not. Why should a government that wants to construct a road build it inferior simply because it is financed on concessional terms rather than on commercial terms? No one who has seen infrastructure projects the world over, financed on concessional terms by donor countries and multilateral agencies, could possibly claim that developing countries cannot benefit from aid.

The most recent evidence on the effectiveness of aid, based on a detailed study of seven countries (Bangladesh, Colombia, India, Kenya, Korea, Malawi and Mali), shows that most aid achieves its development objectives, although in several instances the performance could be improved (Cassen (1986)). The provision of aid has played a major part in the green revolution in South-East Asia, in the building of infrastructure in southern Africa, and in the direct provision of basic needs and the relief of poverty in many countries. The study also found, however, that aid performance appeared to be least satisfactory where it is most needed, and that improved performance requires above all more collaboration between aid agencies.

Private Investment and the Multinational Corporation

Critics of international assistance on the political left aim most of their fire against direct private investment by multinational corporations. The growth of private foreign investment in developing countries has been extremely rapid in recent years, rising from $13 billion in 1981 to $25 billion in 1991. This investment by multinational companies with headquarters in developed countries involves not only a transfer of funds (including the reinvestment of profits) but a whole package of physical capital, techniques of production, managerial and marketing expertise, products, advertising and business practices for the maximisation of global profits. There can be little doubt that such investment augments real resources directly; the question is whether such investment contributes to the broader aspects of development relating to the pattern of development and the distribution of income. The activities of the multinationals come under attack on a variety of grounds. First, because they locate in urban areas they widen the income gap between the urban and rural sector, perpetuating dualism and widening the income distribution. This criticism, however, cannot be levelled exclusively against multinationals because any new industrial activity establishing in existing urban centres would have the same effect. A second and more serious criticism is the way in which they encourage and manipulate consumption. Not only do they tend to cater for the tastes of the already well-to-do, which itself acts as a divisive force, but also they tend to encourage forms of consumption among the broad mass of people, particularly in the urban areas, which are inappropriate to the stage of development and often nutritionally damaging. Prime examples are powdered baby milk and coca-cola. These tendencies are not only wasteful, but they encourage acquisitiveness, reduce domestic saving and can worsen balance-of-payments difficulties by encouraging expensive tastes. A third criticism, which we have already dealt with in Chapter 10, is that they may introduce inappropriate technology and retard the development of an indigenous capital-goods industry. Related to this is that multinationals may stifle the growth of indigenous entrepreneurship, so that the net addition to capital accumulation is much less than the investment provided by the multinationals themselves.

Another aspect of the multinationals is that because of their large size and the power they wield, the developing countries in which they operate lose aspects of their national sovereignty and control over economic policy. The companies may

Table 14.6 *The Balance-of-Payments Effects of Private Foreign Investment*

Year	*Gross inflow*	*Foreign investment at beginning of period*	*Foreign investment at end of period*	*Outflow of profits*	*Net inflow*
1	100	100	110	10	90
2	100	210	231	21	79
3	100	331	364.1	33.1	66.9
4	100	464.1	510.5	46.4	53.6
5	100	610.5	671.6	61.1	38.9
6	100	771.5	848.7	77.2	22.8
7	100	948.7	1043.6	94.9	5.1
8	100	1143.6	1258.0	114.4	–14.4

easily avoid the effects of domestic monetary policy because of easy access to foreign capital markets and their own internal resources. They can avoid tax by shifting profits abroad. Countries may wish a company to do one thing, but it may not readily comply because the action may conflict with the global profit objectives of the multinational company as a whole. Firms may exploit resources more quickly than is desirable, and exploit consumers and owners of factors of production through the exercise of monopoly and monopsony power.

There is also the question of the repatriation of profits. Direct private foreign investment has the potential disadvantage, even compared with loan finance, that there may be a continual outflow of profits lasting much longer than outflows of debt-service payments on a loan of equivalent amount. While a loan only creates obligations for a definite number of years, private investment may involve an unending commitment. This has serious implications for the balance of payments and for domestic resource utilisation if foreign exchange is a scarce resource. We can show with a numerical example that in the long run if profits are repatriated the impact of continuous private foreign investment on the balance-of-payments must be negative unless the *gross* inflow of foreign investment grows substantially from year to year. This, of course, then increases the power and influence of foreign interests within the country concerned. Suppose that there is a steady gross inflow of 100 units of foreign capital per annum; that the productivity of capital is 20 per cent; and that one half of the profits are reinvested and the other half are repatriated. **Table 14.6** shows that on these assumptions the balance-of-payments effect turns negative after the eighth year. To keep the net inflow of resources positive requires a steadily rising *gross* flow of private foreign investment, with all the implications that this may have for the pattern of development in the future.

What is the solution to the dilemmas posed above? As Colman and Nixson (1978) succinctly state:

> Transnational corporations cannot be directly blamed for the lack of development (or the direction development is taking) within less developed countries. Their prime objective is global profit maximisation and their actions are aimed at achieving that objective, not developing the host less developed country. If the technology and the products that they introduce are 'inappropriate', if their actions exacerbate regional and social inequalities, if they weaken the balance-of-payments position, in the last resort it is up to the less developed country government to pursue policies which will eliminate the causes of these problems.

It is extremely difficult to measure the full impact and real costs of multinational investment using economic calculus alone, but this is what the developing countries must do. What would be the real income gains and losses of controlling the free mobility of private foreign investment? Alternatively, other ways of taking advantage of foreign private capital might be actively explored, including **joint ventures** and **turn-key projects** whereby the foreign investor pays for and builds the project in collaboration with the host country, which is then run by the host country's staff. There is already evidence that this is the direction in which developing countries are moving. Developing countries must lay down very clearly the conditions under which they will accept multinational investments and monitor the companies' operations so that distorted development and the question of exploitation does not arise.

Political considerations, disillusion with assistance, and a sense of frustration that it has produced little in the way of tangible results, now unite large sections of the political right and left in an uncanny alliance against international resource flows, public and private, from rich to poor countries. In the last resort the arguments largely boil down to an expression of value judgements concerning the nature and character of development. Ignoring political extremists, however, who rarely argue on pragmatic grounds anyway, none of the indictments against international resource flows are sufficient in themselves to establish a case against international assistance as such; only against the form it takes, the terms on which it is given and the use to which it is put within the recipient countries.

Let us now distinguish more clearly the types and magnitudes of international capital flows from various sources, including the OECD, the United Kingdom, OPEC and the World Bank.

The Types and Magnitude of International Capital Flows

The main forms of international capital flows to developing countries consist of:

1. Official flows from bilateral sources (including developed and OPEC countries) and multilateral sources (such as the World Bank and its two affiliates, the International Development Association (IDA), and the International Finance Corporation (IFC)), on concessional and non-concessional terms.
2. Direct private investment.
3. Commercial Bank Loans (including export credits).

Because of the different types of capital flows, and the different terms of borrowing, there is an important distinction to be made between the nominal value of capital flows and their worth in terms of the increased command over goods and services that they represent to the recipient. There is also the distinction to be made between the **return** to international assistance, the **benefit** of international assistance (in a cost–benefit sense) and the **value** of international assistance.

The return to international assistance is the difference between the nominal value of assistance and the repayments discounted by the productivity of the assistance in the recipient country. The return to assistance is measured in the same way as the return to any other investment.

The benefit of assistance is the difference between the nominal value of assistance and repayments discounted by the rate of interest at which the country would have had to borrow in the capital market. The benefit of assistance is measured as a differential as in cost–benefit analysis. It is this calculation which we shall refer to subsequently as the 'grant element' or 'aid component' of the capital flow, representing 'something for nothing' to the recipient country. Clearly, if the terms on which the country borrows from the donor are no different from those prevailing in the free market, there is no grant element attached to the capital transfer.

The benefit of the assistance may differ in turn from its value if the assistance is tied to the purchase of donors' goods which differ in price from the world market price. If the prices are higher, this reduces the value of the grant element of assistance below what it would otherwise be.[1]

Looked at from the point of view of the donor, a positive benefit to the recipient does not necessarily mean a cost or sacrifice to the donor. There is a sacrifice to the donor only to the extent that the opportunity cost of capital, or the rate at which the donor would have had to borrow from another source to give the loan, exceeds the rate of interest charged. Nor is any real resource transfer from the donor country necessarily implied. This depends on whether the donor country provides the real counterpart of the financial flow in terms of an export surplus. It is quite possible that the real transfer may be provided by another donor country. Before going into the measurement of these concepts in greater detail, however, let us first outline the major forms of international capital flows and give some idea of their nominal magnitude.

The Total Net Flow of Financial Resources to Developing Countries

The total net flow of financial resources to developing countries is the total of all official and private flows to developing countries *net* of repayments of past loans (amortisation). It includes flows given *bilaterally* by individual donor countries and *multilaterally* through international organisations, and includes flows both with and without concessionary terms. Most official flows are given on concessionary terms and are referred to as **Official Development Assistance**. To qualify as such, the concessional (or grant) element of the flow must be at least 25 per cent. Only the concessional element of international financial flows really qualify for the term '*Aid*'. The major donors of Official Development Assistance are the eighteen developed countries of the OECD which form the Development Assistance Committee (DAC), and the various multilateral agencies. In addition, in recent years, the countries of OPEC have lent substantial sums on concessional terms. **Non-concessional flows** are primarily bilateral consisting mainly of direct private investment; export credits and syndicated bank loans. The magnitude of these various types of flow over the period 1980 to 1990 is shown in **Table 14.7**. The total net flow of financial resources in 1990 was $140 billion, of which $62 billion was official development assistance and $78 billion consisted of non-concessional flows. In the latter category there was an enormous increase in private bank lending to developing countries up to 1981, following the rise in oil prices, which then fell dramatically during the rest of the 1980s. Official development assistance has grown steadily over the years from both bilateral and multilateral sources in money and real terms. The aid targets set for the developed countries of 1 per cent of their national incomes refer to the total net flow of financial resources, while the target for official development assistance alone is 0.7 per cent of donor countries' national incomes. It must also be remembered that the net flow of financial resources is not the same thing as the flow of *real resources*, since the former excludes interest payments and profit repatriation. If the terms of lending are steady over time the net transfer of resources in any one year (i.e., the gross capital inflow net of amortisation *and* interest and profit payments) will be approximately equal to the estimated grant equivalent or aid component of assistance, the measurement of which is discussed later (see p. 344).

Official Development Assistance

The total flow of official development assistance in 1990 was $62 billion. The contribution of the DAC countries of the OECD was $54 billion, of which approximately $33 billion consisted of grants, including $12 billion for technical assistance and $15 billion represented contributions to multilateral institutions. The recent record of individual DAC countries as providers of official development assistance is shown in **Table 14.8**,

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[1] For the calculation of the grant element, see p. 344.

Table 14.7 *Total Net Resource Flows to Developing Countries*

	1980	*1981*	*1982*	*1983*	*1984*	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*	*1982*	*1985*	*1990*
	Current $ billion											*Per cent of total*		
I. OFFICIAL DEVELOPMENT FINANCE (ODF)	45.6	45.5	44.1	42.4	47.5	48.6	55.8	61.5	65.5	65.5	78.8	38.0	58.5	54.6
1. Official development assistance (ODA)	37.8	36.8	33.8	33.9	34.8	37.0	43.9	48.2	51.4	52.9	62.6	29.1	44.5	43.4
Of which: Bilateral disbursements	30.0	28.9	26.3	26.3	27.2	28.8	35.0	38.3	40.2	40.7	49.4	22.7	34.7	34.3
Multilateral disbursements	7.8	7.9	7.5	7.6	7.6	8.2	8.9	9.9	11.2	12.2	13.2	6.5	9.9	9.2
2. Other ODF	7.8	8.7	10.3	8.5	12.7	11.6	11.9	13.3	14.1	12.6	16.2	8.9	14.0	11.2
Of which: Bilateral	3.0	3.0	3.7	1.3	4.5	3.7	4.1	6.6	7.6	5.6	6.0	3.2	4.5	4.2
Multilateral	4.8	5.7	6.6	7.2	8.2	7.9	7.8	6.7	6.5	7.0	10.2	5.7	9.5	7.1
II. TOTAL EXPORT CREDITS	16.5	17.6	13.7	4.6	6.2	4.0	–0.7	–2.6	–2.1	9.5	4.6	11.8	4.8	3.2
1. DAC countries	15.4	16.2	12.7	3.9	5.2	3.4	–0.9	–2.9	–2.1	9.6	4.5	10.9	4.1	3.1
Of which: Short-term	1.8	2.9	3.0	–3.5	0.3	3.2	3.0	4.1	2.0	4.8	3.0			
2. Other countries	1.1	1.4	1.0	0.7	1.0	0.6	0.2	0.3	x	–0.1	0.1	0.9	0.7	0.1
III. PRIVATE FLOWS	66.2	74.3	58.2	47.8	31.7	30.5	26.7	33.7	43.8	48.3	60.8	50.2	36.7	42.2
1. Direct investment (OECD)	11.2	17.2	12.8	9.3	11.3	6.6	11.3	21.1	25.3	30.4	32.0	11.0	7.9	22.2
Of which: Offshore centres	3.0	4.1	4.1	3.7	3.8	3.7	6.2	12.6	11.4	8.0	..			
2. International bank lending	49.0	52.3	37.9	35.0	17.2	15.2	7.0	7.0	7.8	10.5	18.5	32.7	18.3	12.8
Of which: Short-term	26.0	22.0	15.0	–25.0	–6.0	12.0	–4.0	5.0	4.0	8.0	9.0			
3. Total bond lending	1.6	1.3	4.8	1.0	0.3	4.5	1.2	–0.4	1.3	–0.3	0.8	4.1	5.4	0.6
4. Other private	2.0	1.5	0.4	0.2	0.3	1.3	3.9	2.5	5.2	3.7	5.0	0.3	1.6	3.5
5. Grants by non-governmental organisations	2.4	2.0	2.3	2.3	2.6	2.9	3.3	3.5	4.2	4.0	4.5	2.0	3.5	3.1
TOTAL NET RESOURCE FLOWS (I+II+III)	128.3	137.4	116.0	94.8	85.4	83.1	81.8	92.6	107.2	123.3	144.2	100.0	100.0	100.0

Source: OECD, *Development Cooperation 1991 Review* (Paris).

together with the flow measured as a proportion of the donor's GNP. It will be seen that only the Netherlands, Denmark, Norway, France and Sweden met the aid target in 1990 of 0.7 per cent of GNP. The United States is the major provider of development assistance, but contributes the lowest proportion of GNP (apart from Ireland). The ratio for all DAC countries has not changed over the decade 1980 to 1990.

Total Net Flow of Financial Resources by DAC Countries

As well as providing official development assistance, there are other official flows on non-concessional terms from the DAC countries to the developing countries, and the DAC countries are the major source of the various private flows. The magnitude of these other flows, and the total net flow of financial resources by DAC countries to developing countries and multilateral agencies, is shown in **Table 14.9** for 1989, together with the total flow as a proportion of the donor's GNP. It can be seen that some of the countries that failed to meet the official development assistance target in 1989 managed to meet the total net financial flow target of 1 per cent of GNP by virtue of large volumes of private lending. The $28.9 billion flow of private capital in 1989 compares with $57 billion at its peak in 1981.

United Kingdom Assistance to Developing Countries

The level of total net official flows from the UK to developing countries and multilateral agencies in 1990 was $3263 million, and the level of official development assistance was $2647 million – a slight rise in money terms over the 1980s but a fall in real terms, and a fall as a proportion of GNP

Table 14.8 ***Net Official Development Assistance from DAC Countries to Developing Countries and Multilateral Organisations (1979–81 average, 1985–90)***

Net disbursements *$ million and per cent of GNP*

	1979–81 average		*1985*		*1986*		*1987*		*1988*		*1989*		*1990*	
	$ million	*As % of GNP*	*$ million*	*As % of GNP*	*$ million*	*As % of GNP*	*$ million*	*As % of GNP*	*$ million*	*As % of GNP*	*$ million*	*As % of GNP*	*$ million*	*As % of GNP*
Australia	649	0.47	749	0.48	752	0.47	627	0.34	1 101	0.46	1 020	0.38	955	0.34
Austria	176	0.25	248	0.38	198	0.21	201	0.17	301	0.24	282	0.23	394	0.25
Belgium	604	0.55	440	0.55	547	0.48	687	0.48	601	0.39	703	0.46	889	0.46
Canada	1 106	0.44	1 631	0.49	1 695	0.48	1 885	0.47	2 347	0.50	2 320	0.44	2 470	0.44
Denmark	448	0.73	440	0.80	695	0.89	859	0.88	922	0.89	937	0.93	1 171	0.93
Finland	112	0.24	211	0.40	313	0.45	433	0.49	608	0.59	706	0.63	846	0.64
France	3 929	0.65	3 995	0.78	5 105	0.70	6 525	0.74	6 865	0.72	7 450	0.78	9 380	0.79
Germany	3 380	0.45	2 942	0.47	3 832	0.43	4 391	0.39	4 731	0.39	4 948	0.41	6 320	0.42
Ireland	29	0.17	39	0.24	62	0.28	51	0.19	57	0.20	49	0.17	57	0.16
Italy	541	0.14	1 098	0.26	2 403	0.40	2 615	0.35	3 193	0.39	3 613	0.42	3 395	0.32
Japan	3 070	0.29	3 797	0.29	5 634	0.29	7 342	0.31	9 134	0.32	8 965	0.31	9 069	0.31
Netherlands	1 538	0.99	1 136	0.91	1 740	1.01	2 094	0.98	2 231	0.98	2 094	0.94	2 592	0.94
New Zealand	69	0.32	54	0.25	75	0.30	87	0.26	104	0.27	87	0.22	93	0.22
Norway	461	0.88	574	1.01	798	1.17	890	1.09	985	1.13	917	1.05	1 205	1.17
Sweden	956	0.84	840	0.86	1 090	0.85	1 375	0.88	1 534	0.86	1 799	0.96	2 012	0.90
Switzerland	234	0.23	303	0.31	422	0.30	547	0.31	617	0.32	558	0.30	750	0.31
United Kingdom	2 067	0.42	1 530	0.33	1 737	0.31	1 871	0.28	2 645	0.32	2 587	0.31	2 647	0.27
United States	5 868	0.22	9 403	0.24	9 564	0.23	9 115	0.20	10 141	0.21	7 676	0.15	11 366	0.21
Total DAC	25 238	0.35	29 429	0.35	36 663	0.35	41 595	0.35	48 114	0.36	46 712	0.34	54 077[a]	0.35

a): Excluding debt forgiveness of non-ODA claims in 1990.

from 0.42 per cent in 1980 to 0.27 in 1990. This is way below the UN target of 0.7 per cent. Most of the development assistance is now given in the form of grants. This represents a dramatic softening of the terms of assistance over the years, when in the 1960s assistance was largely in the form of loans at near market rates of interest. Just over one-half of assistance is bilateral, and the remainder multilateral; 75 per cent is financial aid and 25 per cent represents technical assistance. Technical assistance is an integral part of the UK aid programme and expenditure on it has risen from $100 million in 1970 to $709 million in 1990. Of total bilateral aid, approximately 45 per cent is for technical assistance; 30 per cent for projects, and the remainder for non-project purposes including programme and debt relief. Over 60 per cent of gross bilateral aid goes to the 50 poorest countries with a *per capita* income of less than $1000 at 1990 prices. The recent levels of total official and private flows are shown in **Table 14.10**.

As far as the geographical distribution of total official bilateral assistance is concerned, approximately 50 per cent was disbursed to sub-Saharan Africa in 1990; 37 per cent to Asia, and the remainder to South America, Oceania and Europe. Over 130 countries received assistance varying in amounts from as little as $5000 to $140 million in the case of India, the largest recipient. To put the Indian sum in perspective, however, this total represents only 15 cents per head of India's population. This compares with the average *per capita* assistance from the UK to all developing countries of 90 cents.

The fact that assistance is tied to the purchase of UK goods means, of course, that the foreign exchange cost of the UK aid programme is much less than the budgetary cost or financial flow.

Table 14.9 ***Total Net Flow of Financial Resources by DAC Countries to Developing Countries and Multilateral Agencies, 1989***

	Flow of private capital[1]		*Total net flow of financial resources*[2]	
	$ million	*As % of GNP*	*$ million*	*As % of GNP*
Australia	306	0.11	1 547	0.57
Austria	–111	–0.09	152	0.12
Belgium	377	0.25	1 467	0.96
Canada	–208	–0.04	2 718	0.51
Denmark	46	0.05	904	0.90
Finland	221	0.20	941	0.83
France	–1 630	–0.17	7 232	0.75
Germany	5 495	0.46	12 147	1.01
Ireland	30	0.11	105	0.36
Italy	974	0.47	5 752	0.67
Japan	13 502	0.08	24 133	0.84
Netherlands	169		2 460	1.10
New Zealand	–	–	100	0.25
Norway	–43	–0.05	902	1.03
Sweden	412	0.22	2 343	1.25
Switzerland	2 018	1.08	2 660	1.43
United Kingdom	69	0.01	3 377	0.41
United States	7 325	0.14	16 382	0.32
Total DAC countries	28 951	0.21	85 322	0.61

[1] Excluding grants by voluntary agencies.

[2] Including official development assistance, but excluding grants by voluntary agencies.

Source: OECD, *Development Cooperation 1991 Review*.

An interesting study of the effect of UK assistance on British exports has been undertaken by Mr Hopkin *et al.* (1970) for the period of the mid-1960s. Although the study is now somewhat dated, the methodology is interesting and it still has relevance because the present level of aid-tying is little different from what it was in the 1960s. The calculations are shown in **Table 14.11.**

Considering simply the direct effect of assistance on the balance-of-payments, the calculations suggest that for every £100 of assistance, £72.5 'returns' in the form of increased exports. The direct effect of assistance on exports, however, is not an adequate measure of the true return to the balance of payments because certain indirect effects are ignored. Some of the assistance may be tied to exports which would have been bought by the recipient country anyway. In this case, assistance merely releases foreign exchange, some of which may be spent on UK exports but some of which may be spent elsewhere. It is difficult to obtain a direct measure of the extent of what may be called 'switching', but Hopkin puts the loss at £18.9 million, thus lowering the true return below the *prima facie* return by the same amount. Offsetting this, however, there are bound to be induced imports from the spending of assistance in the recipient country, some of which are likely to be bought from the donor country. In the case of Britain this is estimated by Hopkin to be £4.1 per £100 of assistance. Last, there will be reflection effects as a result of assistance being spent in third countries to which the donor is a supplier. Britain is estimated to benefit from this effect to the extent of £4.9 per £100 of assistance. The effect of these three sorts of indirect effects on the estimated return to the United Kingdom of £100 of bilateral assistance may be summarised as follows, and a calculation of the 'true' return made:

Prima facie return	+£72.5
Effect of switching	−£18.9
Induced imports	+£ 4.1
Reflection effects	+£ 4.9
	= +£62.6

Ignoring repayments of loans and interest, the immediate foreign exchange cost of bilateral assistance is only 37.4 per cent of the total disbursements.

The United Kingdom's balance of payments probably gains from international assistance in general. Its exports benefit from assistance provided by other countries. The United Kingdom provides approximately 5 per cent of total official assistance from developed to developing countries but supplies 12 per cent of the exports from developed to developing countries. The World Bank has estimated that for every £1 the United King-

Table 14.10 ***Total Net Flow of Financial Resources from the United Kingdom to Developing Countries and Multilateral Agencies ($ million)***

	1979–1981 average	*1987*	*1988*	*1989*	*1990*
NET DISBURSEMENTS					
I. Official Development Assistance (ODA), (A + B)	**2 067**	**1 871**	**2 645**	**2 587**	**2 647**
ODA as % of GNP	*0.42*	*0.28*	*0.32*	*0.31*	*0.27*
A. Bilateral Official Development Assistance (1 + 2)	1 290	1 008	1 430	1 463	1 483
1. Grants and grant like contributions	1 303	1 093	1 528	1 548	1 567
of which: Technical assistance	444	462	642	608	709
Administrative costs	62	65	82	79	99
2. Development lending and capital	–13	–85	–98	–86	–83
of which: New development lending	–17	–114	–128	22	11
B. Contributions to multilateral institutions (1 + 2 + 3)	778	863	1 215	1 124	1 164
1. Grants	425	544	725	744	814
of which: UN Agencies	118	158	192	190	196
EEC	284	363	488	499	587
2. Capital subscription payments and similar to	352	320	489	381	352
of which: IDA	286	219	311	286	310
Regional Development Banks	66	84	50	88	41
3. Concessional lending	1	–	–	–1	–2
II . Other Official Flows (OOF), net (A + B)	**109**	**264**	**323**	**459**	**616**
A. Bilateral Other Official Flows (1 + 2)	109	264	323	459	616
1. Official export credits[a]	–530	191	196	342	464
2. Equities and other bilateral assets	639	73	127	117	151
B. Multilateral Institutions	–	–	–	–	–
III. Grants by Private Voluntary Agencies	**108**	**221**	**239**	**262**	**327**
IV. Private Flows at Market Terms (long term) (1 to 4)	**10 241**	**1 136**	**1 082**	**69**	**–8 020**
1. Direct investment	1 647	3 014	3 831	3 945	2 664
2. Bilateral portfolio investment and other	7 250	–2 458	–1 425	–7 542	–10 835
3. Multilateral portfolio investment	–	–	–	–	–
4. Private export credits	1 344	580	–1 324	3 666	–
V. Total Resource Flows (long term) (I to IV)	**12 525**	**3 492**	**4 289**	**3 377**	**–4 430**
Total Resource Flows as % of GNP	*2.56*	*0.51*	*0.53*	*0.44*	*–0.46*

Source: OECD, *Development Cooperation 1991 Review* (Paris).

dom gives the IDA it receives £1.5 of export orders from projects financed by IDA credits. This, of course, is a statistical association, not a causal connection.

The level of net private flows to developing countries from the UK is very volatile from year to year. During the 1970s there was a colossal increase in the amount of bank lending and portfolio investment in developing countries, largely consisting of the recycling of OPEC oil revenues deposited in London. The average annual level of private flows from 1970 to 1972 was only $500

Table 14.11 ***Effect of British Aid on the Balance of Payments***

Types of aid	*Percentage of bilateral aid 1964–6*	*Prima facie return (per cent) (i.e. direct impact on exports)*
(1) *Capital aid*		
(*a*) fully tied	36.9	100.0
(*b*) partially tied	18.8	60.0
(*c*) untied:		
budgetary	13.8	3.5
other	14.4	61.0
(2) *Technical assistance*		
(*a*) expenditure in the UK	5.1	100.0
(*b*) expenditure overseas	11.0	90.2
(3) *Total direct return* (weighted average of above)		72.5

million. This had risen to $10 billion in 1980, but has since fallen back. Because of these private flows, the UN target for total flows of 1 per cent of national income is often met, while the target for official development assistance has never been met.

■ OPEC Assistance

The oil-producing countries which form OPEC also provide substantial amounts of official development assistance to developing countries, both bilaterally and in support of various multilateral development agencies although much less now than in 1980. The grant element of OPEC assistance is substantial, averaging 90 per cent in 1990. The record of the OPEC countries is shown in **Table 14.12**.

Table 14.12 ***Official Development Assistance from OPEC Members, 1990 ($ million)***

	Official development assistance	*% of GNP*
Nigeria	13	0.06
Algeria	7	0.03
Venezuela	15	0.03
Saudi Arabia	3692	3.90
Libya	4	0.01
Kuwait	1666	–
United Arab Emirates	888	2.65
Total OPEC	6341	

Source: *World Development Report*, 1992.

■ Multilateral Assistance

The major sources of multilateral assistance to developing countries are the World Bank and its two affiliates, the International Development Association (IDA) and the International Finance Corporation (IFC); the United Nations; and various Development Banks. Total disbursements in 1989–90 totalled over $18 billion, of which nearly 10 billion was on concessional terms. A detailed breakdown of the lending by the various multilateral agencies in 1989–90 is shown in **Table 14.13**.

The disbursements by multilateral agencies to developing countries consist not only of the contributions of developed countries but also of funds

Table 14.13 *Net Disbursements by Multilateral Agencies, 1989–90 ($ million)*

	Concessional	*Non-concessional*
World Bank	–	4156
International Development Association (IDA)	3589	–
International Finance Corporation (IFC)	–	886
Inter-American Development Bank	150	1159
African Development Fund	548	908
Asian Development Fund	1010	933
International Fund for Agricultural Development (IFAD)	118	–
United Nations Agencies	3900	–
Other	562	322
Total	9877	8364

Source: OECD, *Development Cooperation 1991 Review.*

raised on the capital market and repayments of previous loans. As can be seen from **Table 14.13**, the World Bank is essentially a commercial institution lending on non-concessional terms, and it raises large sums of money on the world's capital markets. The IDA is the 'soft' loan affiliate of the World Bank which dispenses loans at very low rates of interest with long repayment periods. The IFC concentrates on encouraging private enterprise in developing countries by making equity investments.

■ World Bank Activities

The activities of the World Bank since its inception have broadly reflected changes in thinking about development policy and development priorities – changes that the World Bank itself has played a large part in promoting. In the early years, and throughout the 1960s, the major emphasis of the Bank was on financing infrastructure projects in the field of power generation and distribution; transportation; ports; telecommunications, and irrigation. There was very little support for agriculture and rural development, or industry and tourism; and programme loans (as opposed to project assistance) were largely confined to countries outside those classified as less developed.

The Bank began to realise, however, that infrastructure investment was not enough; that it had a role to play in lending to support directly productive activities. It also recognised inadequacies in education and managerial skills, and became increasingly aware that the development taking place was not trickling down to the vast masses of the poor. In the late 1960s, and throughout the 1970s, the Bank began to take a more activist role in the fields of agriculture and in helping both the rural and urban poor. Mr McNamara, the President of the Bank from 1968 to 1981, inaugurated this radical change of emphasis in his annual address to the Bank in Nairobi in 1973. He defined absolute poverty as 'a condition of life so degraded by disease, illiteracy, malnutrition and squalor as to deny its victims basic human necessities', and he pledged the Bank to make a concerted attack on rural poverty, to raise the productivity of the poor and to raise the incomes of small farmers. The objective was to provide most of the benefits of lending to those in the bottom 40 per cent of income groups. In 1975, the Bank announced that it would also attempt to deal with the problems of the urban poor by promoting productive employment opportunities on labour-intensive projects, and by developing basic services to serve the poor at low cost, e.g. water supplies, sanitation, family planning, etc. The Bank has

Table 14.14 *World Bank Lending 1989*

	Total $ million	*Per cent of total*
Social and administrative infrastructure	3 310	19.4
Education	751	4.4
Health and population	393	2.3
Planning and other public admin.	717	4.2
Other (including water supply)	1 450	8.5
Economic infrastructure	6 450	37.8
Transport and communication	2 440	14.3
Energy	2 969	17.4
Other	1 041	6.1
Production	6 092	35.7
Agriculture	2 781	16.3
Industry, mining, construction	2 594	15.2
Trade, banking, tourism	734	4.3
Programme assistance	1 212	7.1
Total (gross)	17 064	

Source: OECD, *Development Cooperation 1991 Review*.

already financed a number of so-called 'integrated urban projects' in over twenty-five countries, lending for various urbanisation programmes.

It was mentioned in Chapter 1 that the new President of the World Bank, Mr Lewis Preston, announced in May 1992 that poverty reduction will be the 'benchmark by which our performance as a development institution will be measured'.

The current amount and distribution of World Bank assistance for various purposes is shown in **Table 14.14**.

■ Structural Adjustment Lending

A further new initiative was announced by the Bank in October 1979 of **structural adjustment lending** to countries in order to support their balance of payments. To qualify for structural adjustment loans, however, a country must adopt policies acceptable to the Bank designed to secure external equilibrium in the long run without restraining demand and sacrificing growth. Structural adjustment with a human face is now the watchword (see Cornia, Jolly and Stewart (1987 and 1988)). Balance-of-payments support has been the traditional preserve of the International Monetary Fund (see Chapter 16), but there is a difference of emphasis between the Fund and the Bank. Whereas the policies of the Fund focus primarily on balance-of-payments management, the Bank is more concerned with promoting policies to increase efficiency and incentives to raise export earnings and reduce import payments. Clearly, however, the roles of the two institutions now overlap and will do so increasingly as the Fund itself insists on supply-side policies as a condition for assistance, as well as on the traditional demand-side policies of devaluation and monetary contraction. The distinct roles of the IMF and the World Bank are outlined in the box below.

The Distinct Roles of the IMF and the World Bank

International Monetary Fund	The World Bank
• Oversees the international monetary system and promotes international monetary co-operation. • Promotes exchange stability and orderly exchange relations among its members. • Assists members in temporary balance-of-payments difficulties by providing short- to medium-term financing, thus providing them with the opportunity to correct maladjustments in their balance of payments. • Supplements the reserves of its members by allocating SDRs if there is a long-term global need. • Draws its financial resources principally from the quota subscriptions of its members.	• Seeks to promote the economic development and structural reform in developing countries. • Assists developing countries through long-term financing of development projects and programmes. • Provides special financial assistance to the poorest developing countries through the International Development Association (IDA). • Stimulates private enterprises in developing countries through its affiliate, the International Finance Corporation (IFC). • Acquires most of its financial resources by borrowing on the international bond market.

The World Bank itself defines structural adjustment loans as 'non-project lending to support programmes of policy and institutional change to modify the structure of the economy so that it can maintain both its growth rate and the viability of its balance of payments in the medium term'. The loans are medium term geared to supply-side reforms, e.g. improving the efficiency with which markets operate; price reform; changing the price of tradeable goods relative to non-tradeables; getting the 'correct' terms of trade between agricultural goods and industrial goods; reducing the size of the public sector; financial reforms; tax reforms, etc. Governments must commit themselves to policy reform before loans are disbursed. Since 1980, 187 loans have been disbursed to over 50 countries with a total value of $32 billion. In 1990, $4 billion was disbursed, representing 20 per cent of World Bank lending.

Since the purpose of structural adjustment lending is to improve the economic performance of countries, the evaluation of lending by the World Bank and independent investigators has focused on four key macroeconomic indicators: the growth of GDP; the growth of exports; investment; and the balance of payments. So far, the impact seems to have been disappointing. According to research on 40 countries by Harrigan and Mosley (1991), the effect on GDP growth has been negligible; export growth and the balance of payments has improved, but investment has declined. The main reason for the disappointing results appears to be the heavy requirements (or conditionality) placed on recipient governments which depress demand and depress confidence. There is a general consensus that the requirements should be less stringent and more selective, and more sensitive to particular country circumstances (see Mosley, Harrigan and Toye (1991)).

This is confirmed by a study by the World Bank itself which concludes that structural adjustment lending has achieved a modest degree of success in helping developing countries improve their balance of payments, but it has failed to lead to an upsurge of investment or to enable countries to 'grow out of debt' (World Bank (1990)).

The Recipients of External Assistance

We end the statistical section by showing the distribution of external capital by country for 1970 and 1990 (the latest year available at the time of writing). It is well to remember that while official development assistance in 1990 amounted to approximately $62 billion, it was spread over 3 billion people in developing countries giving an average annual *per capita* receipt of $20. In India, the largest developing country in receipt of official development assistance from the DAC, assistance per head is approximately $2 per annum. The net inflows of official and private capital for the low- and middle-income countries of the world are shown in **Table 14.15**. Aggregate net resource flows are the sum of net flows of long-term debt, official grants and net foreign direct investment. Aggregate net transfers are equal to aggregate net resource flows minus interest payments on long-term loans and remittances of all profits. It will be seen that for many Latin American countries (and also for other countries too) there was a *negative* net transfer of resources in 1990 reflecting heavy debt-service repayments from inflows in the past and the reduction in new lending. Brazil, for example, has a negative resource transfer of nearly $4 billion, while the figure for Argentina and Venezuela is over $1.5 billion.

Estimating the Aid Component of International Assistance

Because of the different nature of the various capital flows, a common procedure is required for measuring the equivalence of the different flows. Clearly grants and loans are not equivalent since the latter have to be repaid and the former do not. A standard procedure for making the flows equivalent is to estimate the **grant equivalent or aid component** of the different flows by taking the difference between the nominal flow and the future repayments due discounted by the free market rate of interest, which was our earlier measure of the benefit of assistance. A capital inflow which is a pure grant (with no repayment obligations) is 'worth ' its face value. A capital inflow which has to be repaid with interest is not 'worth' its face value. How much less it is 'worth' than its face value depends on the rate at which the repayments are discounted. If the rate of interest at which the country would have had to borrow in the free market is greater than the actual rate of interest it has to pay, the 'worth' or benefit will be positive. If the rate of interest at which it would have had to borrow is less than the actual rate, the 'worth' or benefit will be negative because the recipient would be paying back more than it need have done. (This is unlikely to happen.) The grant equivalent or aid component of assistance is measured in this differential benefit sense. The return on the assistance may of course be much greater than the benefit if the productivity of the assistance is higher than the free-market rate of interest.

To measure the grant equivalent or aid component of international flows from the donor's point of view, the correct discount rate to employ would seem to be the interest rate at which the donor would have to borrow to make the loan. The grant equivalent of the loan is then a measure of the cost of the lender of making the loan on a concessionary basis. Traditionally the discount rate suggested was the opportunity cost of funds in the donor country but this would be the appropriate discount rate only if it is assumed that loans are made at the sacrifice of domestic investment.

Only if the discount rate used by the donor is the same as the discount rate used by the recipient will the benefit to the recipient equal the cost to the donor. If the donor discounts repayments at a lower rate than the recipient, benefit exceeds cost and the transfer of capital increases total welfare. If the discount rate used by the donor is less than the interest rate charged on the capital flow, the flow would have to be interpreted as yielding positive returns to the donor country, which is a typical Marxist viewpoint.

Other factors determine the grant equivalent of a loan as well as the effective interest-rate subsidy. First, there is the **grace period** of the loan between its disbursement and the first repayments. The longer the grace period for a loan of a given maturity, the less the present value of the future discounted repayments. Second, there is the **maturity of the loan** to consider. This is important because the longer the maturity, the longer the concessionary interest rate is enjoyed and the less the present

Table 14.15 ***Aggregate Net Resource Flows and Net Transfers***

	Net flows of long-term debt (millions of dollars)											
	Public and publicly guaranteed		*Private nonguaranteed*		*Official grants*		*Net foreign direct investment*		*Aggregate net resource flows*		*Aggregate net transfers*	
	1970	*1990*	*1970*	*1990*	*1970*	*1990*	*1970*	*1990*	*1970*	*1990*	*1970*	*1990*
Low-income economies												
Mozambique	. .	145	0	8	0	764	0	0	0	917	0	909
Tanzania	49	246	5	0	6	729	0	0	60	975	57	904
Ethiopia	13	133	0	0	6	590	4	0	23	723	10	678
Somalia	4	40	0	0	9	304	5	0	17	344	16	340
Nepal	−2	135	0	0	16	160	0	0	14	295	14	269
Chad	3	93	0	0	11	179	1	0	15	271	13	268
Bhutan	. .	4	0	0	0	28	0	0	0	32	0	29
Lao PDR	4	99	0	0	28	66	0	0	33	165	32	162
Malawi	37	84	0	−1	7	262	9	0	52	345	41	312
Bangladesh	0	846	0	0	0	891	0	3	0	1 740	0	1 582
Burundi	1	67	0	0	7	144	0	1	8	212	8	196
Zaire	3	175	0	0	37	319	0	0	41	494	2	393
Uganda	22	258	0	0	2	260	4	0	27	519	10	503
Madagascar	5	116	0	0	20	360	10	0	36	476	34	383
Sierra Leone	−3	35	0	0	1	47	8	0	7	81	−1	78
Mali	23	87	0	0	12	229	0	−1	34	315	32	294
Nigeria	18	−479	−5	−15	40	149	205	588	259	243	−207	−1 653
Niger	11	105	0	6	15	224	1	0	26	334	23	312
Rwanda	0	53	0	0	10	159	0	8	10	220	10	207
Burkina Faso	0	61	0	0	13	170	0	0	13	230	11	220
India	594	3 029	0	−104	157	684	6	0	757	3 610	565	200
Benin	1	90	0	0	9	110	7	0	17	200	13	196
China	. .	6 249	0	0	0	333	0	3 489	0	10 071	0	7 492
Haiti	1	31	0	0	2	88	3	8	6	128	2	114
Kenya	17	394	30	−37	4	942	14	26	64	1 324	−2	1 010
Pakistan	375	923	2	−13	79	381	23	249	479	1 540	395	978
Ghana	28	257	0	0	9	440	68	15	104	712	79	646
Central African Rep.	−1	116	0	0	6	87	1	0	7	203	5	194
Togo	3	54	0	0	7	97	1	0	11	152	5	98
Zambia	316	61	5	2	2	633	−297	0	26	696	−65	638
Guinea	80	113	0	0	1	106	0	0	80	219	76	203
Sri Lanka	36	301	0	−2	14	226	0	31	50	556	30	409
Mauritania	1	51	0	0	3	97	1	0	5	148	−8	136
Lesotho	0	38	0	0	8	69	0	17	8	124	7	103
Indonesia	383	476	134	4 556	84	342	83	964	683	6 337	510	1 242
Honduras	26	167	7	−18	0	223	8	0	41	373	17	191
Egypt, Arab Rep.	−29	477	0	−81	150	4 376	0	947	122	5 719	82	4 558
Liberia	−4	0	0	0	1	49	0	0	−3	49	−9	49
Myanmar	2	77	0	0	16	75	0	0	17	152	14	139
Sudan	30	171	0	0	2	476	0	0	32	647	16	639

Table 14.15 ***Aggregate Net Resource Flows and Net Transfers (continued)***

	Net flows of long-term debt (millions of dollars)											
	Public and publicly guaranteed		*Private nonguaranteed*		*Official grants*		*Net foreign direct investment*		*Aggregate net resource flows*		*Aggregate net transfers*	
	1970	*1990*	*1970*	*1990*	*1970*	*1990*	*1970*	*1990*	*1970*	*1990*	*1970*	*1990*
Middle-income economies **Lower-middle-income**												
Bolivia	38	125	1	−24	0	193	−76	45	−37	340	−61	193
Zimbabwe	−5	71	0	76	0	210	0	0	−5	356	−9	209
Senegal	13	83	−2	4	16	512	5	0	32	599	15	481
Philippines	67	1 450	90	245	16	394	−25	530	148	2 618	80	781
Côte d'Ivoire	49	546	2	371	12	286	31	−48	94	1 156	33	756
Dominican Rep.	31	52	2	−5	10	31	72	133	115	210	102	150
Papua New Guinea	43	101	91	7	144	277	0	0	278	385	268	209
Guatemala	17	53	4	4	4	67	29	0	55	124	18	38
Morocco	131	603	5	0	23	472	20	165	179	1 240	134	292
Cameroon	24	637	9	−77	21	376	16	0	70	936	61	746
Ecuador	26	159	−4	5	2	51	89	82	112	297	83	−241
Syrian Arab Rep.	29	−892	0	0	11	582	0	0	41	−311	35	−433
Congo	13	−6	0	0	5	51	0	0	18	46	15	−58
El Salvador	2	−2	8	−14	2	160	4	0	15	145	−1	70
Paraguay	7	−31	0	−9	2	9	4	79	13	47	5	−43
Peru	48	99	7	−35	20	186	−70	34	4	285	−231	169
Jordan	12	32	0	0	41	670	0	0	53	702	51	430
Colombia	174	−18	−59	−149	21	59	43	501	179	392	26	−1991
Thailand	28	−911	62	302	6	219	43	2 376	139	1 985	87	468
Tunisia	42	112	0	−7	42	184	16	58	99	347	61	−173
Jamaica	9	−37	1	−8	3	129	162	0	174	84	6	−143
Turkey	203	918	−2	260	21	817	58	697	280	2 692	202	−293
Romania	0	19	0	0	0	0	0	0	0	19	0	19
Poland	24	−102	0	0	0	0	0	89	24	−13	24	−239
Panama	44	−45	0	0	0	91	33	−30	77	16	51	−98
Costa Rica	9	−62	10	−1	4	119	26	111	49	168	31	−60
Chile	242	233	206	1 274	11	66	−79	595	381	2 167	172	484
Botswana	6	−37	0	0	9	90	0	148	15	201	14	−133
Algeria	279	−589	0	0	56	76	47	0	381	−513	221	−2 578
Bulgaria	..	−391	0	0	0	0	0	0	0	−391	0	−847
Mauritius	1	50	0	41	3	27	2	41	5	160	3	96
Malaysia	−2	−441	3	215	4	54	94	2 902	99	2 730	−92	−417
Argentina	139	−749	−4	0	1	39	11	2 036	1 47	1 326	−264	−1 665
Iran, Islamic Rep.	..	−86	0	0	0	52	28	0	28	−33	−788	−61
Angola	..	495	0	0	0	160	0	0	0	655	0	566
Lebanon	10	20	0	0	2	95	0	0	12	114	11	83
Nicaragua	28	441	0	0	2	251	15	0	45	692	15	687
Yemen, Rep.	6	187	0	0	8	273	0	0	14	460	14	437

Table 14.15 ***Aggregate Net Resource Flows and Net Transfers (continued)***

	Net flows of long-term debt (millions of dollars)											
	Public and publicly guaranteed		*Private nonguaranteed*		*Official grants*		*Net foreign direct investment*		*Aggregate net resource flows*		*Aggregate net transfers*	
	1970	*1990*	*1970*	*1990*	*1970*	*1990*	*1970*	*1990*	*1970*	*1990*	*1970*	*1990*
Upper-middle-income												
Mexico	297	5 286	61	438	11	64	323	2 632	692	8 420	50	1 341
South Africa	..	..	..	..	..	..	..	..	..	..	..	..
Venezuela	174	1 304	41	−173	0	9	−23	451	192	1 591	−429	−1 630
Uruguay	−10	−23	9	5	2	14	0	0	1	−4	−18	−325
Brazil	640	−32	700	−133	26	71	421	1 340	1 787	1 247	1 177	−3 816
Hungary	..	340	0	0	0	0	0	0	0	340	0	−1 268
Yugoslavia	9	−331	261	5	0	0	0	0	270	−326	166	−1 972
Czechoslovakia	..	882	0	0	0	0	0	207	0	1 089	0	724
Gabon	17	108	0	0	10	41	−1	−50	26	100	23	−45
Trinidad and Tobago	−3	−117	0	0	1	7	83	109	81	0	16	−331
Portugal	−63	−978	−1	86	0	14	0	2 123	−64	1 245	−124	78
Korea Rep.	246	−341	25	−561	119	13	66	715	56	−174	374	−2 214

Source: *World Development Report, 1992.*

value of the future discounted repayments. Through the technique of discounting, any combination of repayment terms can be brought to a common measure. All three factors referred to – the interest-rate subsidy, the grace period and the maturity of the loan – can be incorporated into a simple formula for calculating the grant equivalent of a loan. The grant equivalent or aid component of a loan (as a percentage of its face value) is called the **grant element**, equal to:

$$\left[\frac{F - \left(\sum_{t=1}^{T} \frac{P_t}{(1+r)^t}\right)}{F}\right] 100$$

where F is the face value of the loan, P_t is the total repayment of principal and interest in year t, T is the maturity of the loan and r is the rate of discount. Since P_t includes interest charges it can be seen that the lower the interest rate relative to the rate of discount (r), and the more repayments can be delayed through time, the greater will be the grant element of the loan. The grant element can be worked out for different combinations of interest rates, discount rates, grace periods and length of maturity. At the two extremes, if the financial flow is a pure grant then $P_t = 0$, and the grant element is 100 per cent. If the financial flow is at a rate of interest equal to the market rate of interest, and the grace period and maturity of the loan are the same as in the free market, the sum of the discounted future repayments will equal the face value of the flow, and the grant element will be zero. For combinations of conditions between the two extremes, **Table 14.16** gives some illustrative calculations. For example, the grant element of a ten-year loan at 5 per cent interest with a grace period of five years with the recipient discounting repayments at 10 per cent would be 26.1 per cent. It can be seen that the grant element is quite sensitive to small changes in the interest rate and the discount rate but relatively insensitive to variations in the grace period and the length of maturity. Long maturities and grace periods are mainly means of providing liquidity rather than aid. The terms of Official Development Assistance from the DAC members in 1989 and 1990 are

Table 14.16 ***Grant Element in Loans: Discount Rate (per cent)***

Rate of interest and maturity period	*5 per cent*			*6 per cent*			*7 per cent*			*10 per cent*		
	No grace period	*5 years' grace*	*10 years' grace*	G = 0	G = 5	G = 10	G = 0	G = 5	G = 10	G = 0	G = 5	G = 10
2 per cent interest												
10 years	12.9	21.2		16.7	24.0		20.0	28.9		29.5	41.8	
20 years	22.1	27.1	31.3	27.8	34.0	39.0	32.8	40.1	45.7	39.8	48.0	53.7
30 years	28.9	34.0	37.0	35.7	40.6	45.4	41.5	47.5	52.4	54.7	62.3	67.3
40 years	34.2	38.0	41.2	41.5	46.2	49.4	47.5	52.7	56.6	60.5	61.6	73.0
3 per cent interest												
10 years	8.6	14.1		12.5	18.0		16.0	23.2		25.8	36.6	
20 years	14.7	18.1	20.9	20.8	25.5	29.2	21.3	32.2	36.6	31.3	38.1	43.1
30 years	19.3	22.6	24.6	26.8	30.5	34.9	33.2	38.1	42.0	47.8	54.5	58.9
40 years	22.8	25.4	27.4	31.1	34.6	37.0	38.0	42.2	45.4	52.9	58.2	63.8
4 per cent interest												
10 years	4.3	7.1		8.1	12.0		12.0	17.4		22.1	31.4	
20 years	7.4	9.0	10.4	13.9	17.0	19.4	19.8	24.2	27.5	34.1	41.1	46.0
30 years	9.6	11.3	12.3	17.8	20.3	22.8	24.9	28.6	31.5	41.0	46.7	50.5
40 years	11.4	12.7	13.7	20.7	23.0	24.6	28.6	31.7	34.1	45.3	50.0	54.6
5 per cent interest												
10 years	0	0	0	4.2	6.0		8.0	11.5		18.4	26.1*	
20 years	0	0	0	6.9	8.5	9.7	13.1	16.2	18.3	28.4	34.2	38.4
30 years	0	0	0	8.9	10.2	11.3	16.6	19.0	20.9	34.2	38.9	42.0
40 years	0	0	0	10.4	11.5	12.1	19.0	21.0	22.6	37.7	41.6	45.5
6 per cent interest												
10 years	a	a	a	0	0	0	4.0	5.8		14.7	20.9	
20 years	a	a	a	0	0	0	6.6	8.1	9.2	22.7	27.4	30.7
30 years	a	a	a	0	0	0	8.4	9.6	10.6	27.4	31.1	33.6
40 years	a	a	a	0	0	0	9.6	10.6	11.4	30.1	33.3	36.4
7 per cent interest												
10 years	a	a	a	a	a	a	0	0	0	11.1	15.7	
20 years	a	a	a	a	a	a	0	0	0	17.1	21.6	23.0
30 years	a	a	a	a	a	a	0	0	0	20.5	23.3	25.2
40 years	a	a	a	a	a	a	0	0	0	22.6	25.0	27.3

a indicates negative aid value.

* Illustrative calculation referred to in the text.

Source: G. Ohlin, *Foreign Aid Policies Reconsidered* (Paris: OECD, 1965) appendix.

shown in **Table 14.17.** The average rate of interest charged has been 2.5 per cent; the average grace period has been nine years and the average maturity of loans has been approximately 27 years. The discount rate normally applied is 10 per cent,[1] giving a grant element of the loans of approximately 65 per cent. In 1990 the grant element of total net financial resource flows was approximately 45 per cent, while the grant element of total official development assistance was over 90 per cent. Since 1972 the DAC countries have been instructed to reach and maintain an average grant element of at least 84 per cent in their disburse-

[1] What might appear to be a low rate of interest is a reflection of the fact that the aid donors' club tends to measure the grant equivalent of assistance from the donors' point of view.

Table 14.17 *DAC Members' ODA Terms 1989 and 1990*
Commitments

			Bilateral ODA loans							
	Share of Grants in total ODA		*Grant element*		*Maturity*		*Grace period*		*Interest rate*	
	Per cent				*Years*				*Per cent*	
	1989	*1990*	*1989*	*1990*	*1989*	*1990*	*1989*	*1990*	*1989*	*1990*
Australia	100.0	100.0	..	..	..	..	..	..		
Austria	41.0	68.1	42.5	62.4	23.0	29.0	7.0	9.0	4.1	2.2
Belgium	93.4	..	..	..	..	..	..	..	..	..
Canada	100.0	95.3	..	(61.5)	..	(30.0)	..	(10.0)	..	(2.5)
Denmark	100.0	100.0	..	..	..	..	..	..	..	..
Finland	98.5	99.1	(57.1)	(57.8)	..	..	..	..	..	..
France	73.2	..	57.4	47.0	28.0	22.0	10.0	9.0	2.8	3.6
Germany	68.7	75.5	60.9	55.0	28.0	25.0	10.0	9.0	2.1	2.8
Ireland	100.0	100.0	..	..	..	..	..	..	..	..
Italy	70.4	87.2	62.0	63.0	20.0	21.0	9.0	9.0	1.6	1.5
Japan	52.4	39.8	59.8	59.7	29.0	29.0	9.0	9.0	2.6	2.5
Netherlands	89.1	92.4	51.2	60.2	23.0	30.0	7.0	8.0	3.0	2.5
New Zealand	100.0	100.0	..	..	..	..	..	..	..	..
Norway	99.7	99.6	26.7	29.9	12.0	10.0	3.0	3.0	4.3	3.4
Sweden	100.0	100.0	..	..	..	..	..	..	..	..
Switzerland	100.0	100.0	..	..	..	..	..	..	..	..
United Kingdom	97.8	..	65.8	27.9	19.0	16.0	5.0	11.0	0.0	6.0
United States	96.0	94.7	63.0	62.9	37.0	34.0	9.0	9.0	2.7	2.5
Total DAC	78.5	77.2	59.1	57.6	28.0	27.0	9.0	9.0	2.5	2.7

Source: OECD, *Development Cooperation Review 1991* (Paris).

ments of official development assistance. The grant element of major forms of multilateral assistance is approximately 50 per cent.

The moral of the foregoing discussion of the grant element of loans is that the real worth of any assistance depends on knowledge of alternatives. Loans which look more generous on the surface because they have a lower interest rate attached may be less valuable than alternatives if they have shorter lives and grace periods. There is also the question of the freedom the recipient has to use the loan as he wishes. This brings us to the subject of aid-tying, which may also substantially affect the calculation of the value of a particular loan compared to alternatives.

■ Aid-Tying

There is a sense in which even the grant equivalent of a capital inflow is not worth as much as it might be if the recipient has to pay higher prices for the goods and services bought with the loan than the prices prevailing in the cheapest markets because the loan is tied to the purchase of the donor's goods. Restrictions tend to be of two kinds: restrictions on where recipients can spend assistance; and restrictions on how assistance can be used. Spending restrictions normally take the form of tying assistance to purchases in the donor country – so-called 'procurement tying'. This reduces the real worth of assistance because it prevents recipients from shopping around to find exactly the goods they want in the cheapest markets. Use restrictions normally mean tying assistance to cover the foreign exchange costs of an identifiable project. Restricting the use of assistance to particular projects as well as to a country's goods amounts to double-tying. Tying can be extremely expensive. One study of twenty projects in Pakistan (Haq (1967)) found that the lowest prices from tied sources were over 50 per cent higher than the lowest bids on international tendering, and Bhagwati (1970) found that on tenders from twenty World Bank loans and three International Development Association credits the ratio of the difference between high bids and successful bids to successful bids was on average 49.3 per cent, which is a measure of the potential excess cost. Moreover, there are many other costs of tying apart from the inability of the recipient to buy in the cheapest market. If there is double-tying, the project for which assistance is given might not fit perfectly into the recipient's development programme, the technology might be inappropriate, the donor may raise the import content unnecessarily, the suppliers may exploit knowing that they have a captive consumer, and servicing over the life of the investment may be expensive.

The excess cost of the imported goods from the tied source represents a form of export subsidy to the donor country in the sense that if the aid-tying had not been imposed, and the donor was to remain competitive, the subsidy would have had to be paid by the donor country itself. In other words, aid-tying saves the donor the cost of the export subsidy. Excess costs probably range between 10 and 20 per cent. It is incredible that developing countries should have to pay interest on export subsidies to developed countries' exporters. It would be fairer to deduct these excess costs, which would relieve the developing countries of some of their interest burden and bring the measure of aid closer to its real worth at the same time. Equally pernicious is the practice of donor countries of both tying assistance and also insisting that loans be repaid in scarce foreign currency. If tying is necessary to protect the balance of payments of donors, it would help for the donors to accept loan repayments in the recipient's currency, saving the recipient's scarce foreign exchange and possibly promoting trade at the same time. The one mitigating factor in all this discussion is that the project for which assistance is given in tied form may have been undertaken anyway using the same source of supplies, in which case the assistance releases the resources for something else which can be used freely. In other words, assistance to a certain extent is fungible because of resource switching. The fungibility of assistance also means that the balance-of-payments gain to the donor from tying may be quite small in practice because one form of purchase is substituted for another. This could be used as a bargaining weapon to reduce the extent of tying, the major reason for which at present seems to be balance-of-payments protection.

Several proposals have been put forward in recent years for mitigating the disadvantages to the developing countries of aid-tying without straining the balance of payments of the donor countries. One possibility is to institute bilateral purchasing arrangements between donor countries whereby assistance from one donor to developing countries could be swopped for assistance from another donor country leaving tying levels intact but increasing the competitive opportunities open to the recipient countries. Another possibility is multilateral purchasing arrangements which allow recipients to buy in the cheapest markets within a group of countries which are so chosen that the gains and losses from untying assistance would cancel out. Levitt (1970) has outlined a precise methodology for establishing an individual donor's exchange gains and losses from assistance which could be used to explore ways of untying assistance and for increasing assistance without increasing the net exchange loss to any donor. To avoid any one donor being involved in an exchange loss through untying, each donor must untie at different rates depending on their relative share of exports to developing (recipient) countries and on their relative share of aid disbursed. Levitt calculated the percentage untying to match untying by the United States of 1 per cent to be: France 1.2 per cent; West Germany 2.1 per cent; the United

Kingdom 3.1 per cent; Japan 9.2 per cent; and the rest of the world 4.3 per cent. Of course, a scheme of this nature can only achieve partial untying because 100 per cent US untying would require over 100 per cent untying by everybody else, which is impossible unless other donors increase their assistance simultaneously. The scope for increasing assistance without any donor suffering an exchange loss is calculated as follows: for every extra $100 from the United States, the aid contributions required from other donors would be: France $22.6, West Germany $22.6; the United Kingdom $32.7; Japan $28.7; and the rest of the world $52.6. The percentage shares of additional aid would be: United States 38.6 per cent; France 8.7 per cent; West Germany 8.7 per cent; the United Kingdom 12.6 per cent; Japan 11.1 per cent; and the rest of the world 20.3 per cent. These shares can also be taken to indicate the shares of *total* aid which would ensure that no donor incurred foreign exchange losses as a result of the aid-giving process.

The Distribution of International Assistance

The distribution of international assistance will affect comparative rates of growth of the developing countries if aid is a positive growth-inducing force. A major study by Papanek (1973) suggests that aid and growth are positively correlated across countries despite the paltry levels of assistance received per head and the fact that the productivity of foreign resources may differ markedly between countries. Papanek relates domestic growth to three types of foreign capital inflow: aid (a), private foreign investment (f), and other foreign inflows (o). Taking eighty-five countries and including the domestic savings ratio (s_d) as an additional explanatory variable, the following equation is estimated (t statistics in parentheses):

$$y = 1.5 + \underset{(6.0)}{0.20\,(s_d)} + \underset{(5.8)}{0.39\,(a)} + \underset{(2.5)}{0.17\,(f)} + \underset{(2.1)}{0.19\,(o)}$$

$$r^2 = 0.37$$

The aid coefficient is highly significant and is also higher in absolute value than any of the other coefficients, suggesting that aid is more productive than domestic resources and other capital inflows. Sub-samples of countries by continents yield similar results.

The criteria for the distribution of bilateral assistance are largely a matter for the donors concerned. In practice the criteria employed often tend to be more non-economic than economic, reflecting historical relationships between countries, as well as military and political objectives. In the past many of the developing countries became a battleground in the Cold War, and the distribution of bilateral assistance still reflects this. Most donors refrain from making explicit the criteria on which they distribute assistance, but Ohlin (1965) suggests that four distinct systems of development assistance can be discerned. First, there is US involvement in world-wide political development. Second, there is the assistance of colonial powers to former territories. Third, there is the emergence of countries, like West Germany and Japan, making extensive grants and loans aimed at promoting economic relationships between donor and recipient. Last, there is the existence of smaller donor countries which give assistance multilaterally.

The criteria for the distribution of multilateral assistance through international agencies, to which many countries contribute, are of wider concern. Although the international aid doctrine is essentially a moral one, the fact remains that if the supply of resources is limited in relation to demand, the issue must be discussed of what principles, if any, should govern the distribution of assistance between countries. Furthermore, the humanitarian motive is very inadequate as an explanation of why and how assistance has actually been given.

There can be no doubt that the distribution of assistance in relation to the population of developing countries is extremely unequal. Whereas some countries receive less than $5 per head per annum, others receive over $100. Assistance as a proportion of national income also differs widely between countries. Although no country, or multilateral institution, has stated explicitly the criteria it uses for allocating assistance between countries, it is clear from the facts that different bodies and countries have different motives and purposes. A large fraction of bilateral assistance, for example, clearly has political and military objectives, and historical relations also play a part in determining the flows. Given that the objectives of aid are obscure and differ between donor countries, it is not surprising that the distribution of assistance cannot readily be explained by such developmental considerations as low *per capita* income, balance-of-payments difficulties and absorptive capacity of the recipient countries. Studies by Davenport (1970) and Henderson (1971) find no significant correlation between *per capita* assistance as a proportion of national income and such factors as past growth rates as a measure of absorptive capacity and the domestic savings ratio or returns on investment as a measure of productive potential. And, if anything, the relation between *per capita* assistance and *per capita* income tends to be positive. The most consistently significant explanatory variable found by Davenport is the ratio of foreign reserves to imports. It apparently pays a country to remain as illiquid as possible. Other than that, it would seem advantageous to be a small island of ex-colonial status in a politically sensitive area of the world. High levels of *per capita* assistance are closely associated with these characteristics. It should also be noted that multilateral assistance appears to be as 'randomly' distributed as bilateral assistance.

The question arises of what criteria for distribution *should* be applied. The answer must depend on the objective function to be maximised. If different countries have different objective functions, the criteria will inevitably differ. The question is more appropriately directed to the multilateral institutions which are supported by the world community and which should not be influenced by the political considerations and historical ties of individual countries.

Most assistance provided by multilateral agencies is in the form of loans. We saw in the section on foreign borrowing that if the interest rate on loans is in excess of the productivity of capital, or the rate inflow of new investment, certain debt-servicing problems will arise. One possible criterion to adopt as a guide to distribution, therefore, might be a productivity criterion, as an indication of a country's capacity to pay back the loan with interest. Before the World Bank lends, it must be satisfied that the borrowing country will be in a position to repay the loan. To this end, its foreign exchange position is scrutinised carefully, because loans are made, and must usually be repaid, in currencies other than that of the borrowing country. How a productivity criterion would be applied in practice, however, is not so clear cut. It can be argued that assistance should not be given to a country where the productivity of capital is below the rate of interest; but should assistance necessarily be distributed to those countries where its productivity is highest? The return from assistance would be maximised, but distribution would be unrelated to needs, and not necessarily related to each country's long-term prospects of development unless they could somehow be incorporated into the measure of productivity. The reciprocal of a country's capital–output ratio may be used as the measure of productivity, but we have already discussed the dangers of using the capital–output ratio as a measure of the productivity of capital, and as a criterion for the allocation of investment resources when different projects have different life-spans and dissimilar external and secondary repercussions. The use of a productivity criterion also takes the terms of the assistance as datum, whereas one might well argue for a change in the terms on which assistance is given, in which case the capacity to repay assistance in foreign exchange becomes less relevant.

The productivity criterion for distribution is closely linked with the notion of absorptive capacity and the view that assistance ought to be distributed according to absorptive capacity. Unfortunately the absorptive capacity criterion suffers from the lack of an adequate and acceptable definition of absorptive capacity. One possible measure is a country's past rate of increase in investment expenditure (Rosenstein-Rodan (1961)), but this ignores the varying levels of productivity on past investment and neglects future productivity. Absorptive capacity clearly implies some acceptable rate of return on investment, but what rate of return should be regarded as acceptable, and how should factors that contribute to the productivity of capital be treated? If a workable definition of absorptive capacity could be agreed on, it might be argued that assistance should not be distributed to countries which lack the capacity to absorb it; on the other hand, it could equally be argued that one of the main purposes of assistance should be to remove obstacles, such as domestic or import bottlenecks, which limit absorptive capacity. Rosenstein-Rodan's suggestion is that assistance should be distributed according to the degree of *induced* domestic effort in the recipient countries which accompanies aid, which he suggests could be judged on the country's own investment record, trends in the marginal savings ratio, and its organisational and administrative capacity. This is very much in line with America's self-help philosophy, or what is called the criterion of potential performance, which insists that before countries receive assistance for non-military purposes they must present self-help development strategies as evidence of their capacity to develop. Crude reliance on savings rates and the rate of growth of productivity, however, can be very misleading indicators of self-help if the initial conditions and natural endowments of countries vary.

Another possible criterion is the availability of foreign exchange. Until recently it was the rule of the World Bank only to meet the foreign exchange costs of particular projects. If foreign exchange is scarce, and the import–export gap is the dominant constraint, this seems an attractive criterion on the surface. On the other hand, it has no regard to the capacity to repay, or absorptive capacity. It would be distribution mainly on the basis of need.

In the absence of an economically objective and value-free criterion for the allocation of assistance, some would argue that the criterion of need is as good as any. One possibility in this connection would be to gear the allocation of assistance to raising *per capita* income in different countries by a specified amount. Assuming that assistance is productive, one type of scheme would be to distribute assistance on a *per capita* income basis according to some target *per capita* income level, which would operate rather like an international negative income tax. Certain graduated rates of *per capita* income assistance could be applied to the gap between the actual level of *per capita* income and the target level. A country which fell way below the target would receive a greater amount of assistance per head of the population than a country which approached the target or exceeded it. The rates of *per capita* assistance would need to be worked out actuarially so that assistance was not solely distributed on the 'worst-first' principle. Given knowledge of the total amount of resources available, rates could be fixed which ensured a wide spread of assistance across countries, but which did not make demands on resources in excess of supply.

Given the paucity of international assistance, one wonders whether very precise criteria for distribution are worth formulating. Annual assistance provided by multilateral institutions amounts to less than $5 per head of the population in developing countries, and the total of non-private resource flows amounts to little more than $20 per head. If bilateral assistance continues to be the major form of official assistance to developing countries, the allocation of resources will continue to be determined largely by political, military and historical considerations. The only hope for a more just and rational allocation of resources available is greater commitment towards multilateral institutions on the part of individual nations. The criteria to be applied will then take on more importance.

Schemes for Increasing the Flow of Resources

The net flow of financial resources to developing countries can be increased in one of two ways, or by a combination of both. Either nominal assistance can be left unchanged and repayment obligations reduced, or nominal assistance can be increased leaving the terms of repayment unchanged. Schemes for increasing the flow of resources can be divided into three main categories: (i) those designed to reduce repayment obligations in scarce foreign currency in the present, such as the Khatkhate proposal discussed earlier; (ii) those designed to increase the effectiveness of assistance by increasing its real worth through untying, which have already been discussed; and (iii) proposals for increasing the volume of assistance as a means of increasing the flow of resources. We shall concentrate here on measures that might increase the flow of resources by raising the volume of nominal assistance.

One quick way to increase the flow would be for *all* the developed countries to meet their assistance targets of 1 per cent of national income for total assistance and 0.7 per cent of national income for official development assistance. The Brandt Report laid emphasis on this. A significant increase in the resource flow by a deliberate budget decision in the developed countries is only likely to occur, however, if there is widespread public support for the programme. In recent years, however, there have been signs of diminished public support for aid, based on the belief that a good deal of assistance is wasted and misused. If there is disillusion with assistance – **or aid 'fatigue'**, as it has been called – an increased flow of assistance in the future is unlikely in the absence of some recognisable improvement in the efficiency with which current assistance is used. It will be difficult to convince people in developed countries, whose standard of living is not that high, to acquiesce in programmes to transfer resources from themselves which are then wasted, or which end up in the hands of people in recipient countries who are richer than themselves. The major reasons for waste and misuse of resources in the past have been inefficiency and corruption on the part of recipient governments and interference from donor countries in the administration of programme assistance (Hayter (1971)). The solution would seem to be schemes for divorcing the granting of assistance from its administration by either donor or recipient, coupled with a much greater interest and involvement of the public in the aid-giving process. This is the essence of a scheme once proposed by Hirschman and Bird (1968), who had two major objectives in mind: first, to reduce the interference of donor countries in the administration of assistance; and second, to involve the individuals of donor countries in the spirit of international aid-giving and to foster their interest in the challenge of development. The basic rudiments of the scheme are that the taxpayers could elect to pay a certain percentage of their tax obligations in the form of donations to a series of competitive 'Development Funds' which would channel financial assistance to various investors in developing countries, private and public. Individuals would receive tax credits for their contribution, and possibly interest-bearing shares in the Funds as well. The 'Development Funds' would be free to invest where they liked, subject to a reasonable degree of equity in the distribution of resources between developing countries and provided the Funds do not acquire complete control of the projects they finance.

The objective of divorcing assistance from its administration, and encouraging public participation, could also be achieved in principle with earmarked taxes for development which were then transferred to the World Bank. The World Bank itself, however, has not escaped criticism of excessive interference and leverage which may have reduced the effectiveness of past assistance; and earmarked taxes are not quite the same thing as tax credits for the encouragement of voluntary participation in the aid-giving process. Even under the Hirschman–Bird scheme, however, it is difficult to see how some national or supranational body can fail to become embroiled in decisions about how international assistance is used, and the complementary domestic policies that should be pursued to make assistance effective.

Questions for Discussion and Review

1. What is the distinctive contribution of dual-gap analysis to the theory of development?
2. Under what circumstances will foreign borrowing (i) raise the rate of growth of income, and (ii) raise the rate of growth of output?
3. Can a country borrow too much?

4. What factors determine the grant element of a financial flow?
5. What do you understand by the term 'debt crisis'?
6. Think of imaginative schemes to relieve the debt-servicing burden of developing countries.
7. Discuss the view that foreign lending is merely a pernicious device for transferring resources from poor to rich countries.
8. How would you evaluate whether foreign capital inflows weaken the internal development effort?
9. Evaluate the costs and benefits to a developing country of investment by multinational companies?
10. How should international assistance be distributed between developing countries?

Part VI
International Trade, the Balance of Payments and Development

■ Chapter 15 ■

Trade and Development

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■ Introduction

In the previous chapter we attempted to establish the role of foreign borrowing in the development process. Using dual-gap analysis, it was shown that foreign borrowing can be used to bridge either a domestic investment–saving gap or a foreign exchange gap, whichever is the larger. We saw that the policy issue is the decision on how far borrowing should go. How large can the import surplus be without leading to too great a dependence on imported capital and to severe future balance-of-payments difficulties in the form of large outflows of debt repayments and profits? The empirical evidence is overwhelming that the conflict is very real between maintaining an adequate growth rate and preserving a reasonable balance on international payments. The ultimate solution must lie in improving the balance of payments through trade. The growth rates of individual developing countries since 1950 correlate better with their export performance than with almost any other single economic indicator. The export performance of the developing countries, however, has continued to lag behind that of developed, industrialised countries. From 1965 to 1990 the volume of exports from developing countries grew at a rate of approximately 4 per cent per annum compared with 7 per cent for developed countries. The discrepancy in rates of growth was even wider in value terms, causing the developing countries' share of the total value of world trade to fall from 30 per cent in 1965 to 18 per cent in 1990. The rates of growth of exports and imports for individual countries, and the terms of trade, which measures the real buying power of exports over imports, are shown in **Table 15.1** for the years 1965 to 1990.

Although the export trade of developing countries is dominated by primary products, the conception must be dispelled that the world is neatly polarised into two camps: the underdeveloped world producing and exporting *solely* primary products in exchange for manufactures from developed countries, and the developed world producing and exporting *solely* manufactures in exchange for primary commodities from developing countries. In practice, a good deal of trade in both manufactures and primary products goes on among the developed and developing countries alike, with the developed countries exporting substantial quantities of primary commodities (especially temperate-zone foodstuffs) and the developing countries exporting a few manufactured goods. Developed countries, in fact, account for about 50 per cent of the world's supply of primary products. In short, the distinction between developing and developed countries is not wholly synonymous with the distinction between primary producers and producers of manufactured goods. This must be borne in mind in discussing the terms of trade – the ratio of export to import prices. There is a distinction to be made between the terms of trade for developing and developed countries and the terms of trade for primary and manufactured goods.

The fact remains, however, that primary products do dominate the balance of payments of most developing countries, and that the developing countries' share of world trade in manufactures is very small. Exports of primary products account for approximately 85 per cent of the export earnings of the developing countries taken together, and manufactured goods from developing countries account for not more than 15 per cent of world trade in manufactures. Moreover, the range of these traded goods is narrow, about 80 per cent consisting of textiles and light manufactures in which world competition is intense. Historically, trade has been an important mainspring of growth for countries at different stages of development. In the nineteenth century the countries that were industrialising had access to food and raw materials in primary-producing countries which allowed the more developed countries to reap the gains from international specialisation. The developing countries, in turn, were assisted in their development by the demand for raw materials and the international investment that followed in its train. The situation today is very different. Most world trade takes place in industrial commodities from which the developing countries are largely excluded, and the demand for developing countries' traditional exports is slack relative to the demand for industrial goods. Except for spasmodic commodity booms, such as between 1972 and 1974, and 1979 to 1980, trade does not seem to work to the equal advantage of both sets of countries.

Three distinct factors have been at work in the developed countries retarding the growth of the traditional exports of the developing countries. First, the pattern of demand has shifted to goods with a relatively low import content of primary commodities. Second, technological change has led to the development of synthetic substitutes for raw materials. Third, developed countries have pursued protectionist policies which have retarded the growth of their imports of both primary commodities and manufactured goods from developing countries.

In view of these trading developments, and the emergence of a foreign exchange gap as the constraint on growth in developing countries, there has been a complete rethinking by some economists in recent years as to the lines on which trade should take place. The balance-of-payments difficulties and foreign exchange shortage of developing countries has led to a switch from viewing trade from the traditional classical standpoint of resource allocation to viewing the effects of trade on the balance of payments. It is balance-of-payments difficulties, necessitating foreign borrowing if growth is to be sustained, that has led to the cry in recent years of **'Trade, not aid'**. The relevance of this slogan is examined in a later section. The problem facing developing countries is not so much *whether* to trade but *in what commodities* to trade, and to ensure that the terms on

Table 15.1 ***Export and Import Growth and Terms of Trade, 1965–90***

	Merchandise trade (millions of dollars)		*Average annual growth rate (per cent)*				*Terms of trade (1987 = 100)*	
	Exports	*Imports*	*Exports*		*Imports*			
	1990	*1990*	*1965–80*	*1980–90*	*1965–80*	*1980–90*	*1985*	*1990*
Low-income economies	**141 176**	**144 431**	**5.1 *w***	**5.4 *w***	**4.8 *w***	**2.8 *w***	**107 *m***	**100 *m***
China and India	**80 059**	**77 037**	**4.1 *w***	**9.8 *w***	**4.4 *w***	**8.0 *w***	**103 *m***	**103 *m***
Other low-income	**61 117**	**67 394**	**5.8 *w***	**1.5 *w***	**5.0 *w***	**−1.9 *w***	**107 *m***	**100 *m***
Mozambique	..	..	..	..	..	..	..	..
Tanzania	300	935	−4.2	*−7.4*	1.6	*−0.5*	101	*108*
Ethiopia	297	1 081	−0.5	−0.3	−0.9	4.2	117	84
Somalia	130	360	4.4	*−3.3*	4.4	*−4.3*	107	*111*
Nepal	*162*	*543*	..	..	..	..	98	..
Malawi	412	576	5.1	4.3	3.3	0.7	104	93
Bangladesh	1 674	3 646	..	7.6	..	8.0	109	95
Burundi	75	235	3.3	−1.9	−0.2	5.0	133	70
Zaire	999	888	4.7	−11.2	−2.9	−4.0	111	163
Uganda	151	458	−3.4	*−1.9*	−5.3	3.2	143	*88*
Madagascar	335	480	0.6	−1.5	−0.4	−0.4	98	102
Sierra Leone	138	146	−2.4	−1.4	−4.6	−2.3	106	80
Mali	347	640	9.5	9.9	4.4	6.7	95	97
Nigeria	13 671	5 688	11.1	−1.6	14.6	−15.1	167	100
Niger	435	230	12.8	4.3	6.6	−8.8	126	77
Rwanda	112	279	7.9	0.1	5.1	11.4	116	98
Burkina Faso	160	480	3.6	10.1	5.7	1.0	108	100
India	17 967	23 692	3.0	6.5	1.2	4.2	96	96
Benin	93	483	..	..	..	..	..	..
China	62 091	53 345	4.8	11.0	7.4	9.8	109	111
Haiti	138	272	4.2	*−12.4*	6.5	−6.2	89	97
Kenya	1 033	2 124	3.9	1.0	2.4	1.6	114	103
Pakistan	5 590	7 377	−1.8	9.0	0.4	4.0	90	95
Ghana	739	1 199	−2.6	3.8	−1.4	−0.1	106	75
Central African Rep.	130	170	−1.3	−1.3	−4.8	6.1	107	109
Togo	300	700	5.6	2.4	8.5	1.4	118	114
Sri Lanka	1 984	2 689	0.2	6.8	−1.2	2.1	103	90
Mauritania	468	248	4.0	3.8	6.3	−5.1	113	107
Indonesia	25 553	21 837	9.6	2.8	13.0	1.4	134	111
Honduras	916	1 028	3.1	2.4	2.5	−0.7	111	104
Egypt, Arab Rep.	2 985	10 340	−0.1	2.1	3.6	−1.7	131	76
Liberia	500	450	4.4	−2.7	1.5	−2.2	97	111
Myanmar	322	270	−2.1	−10.1	−4.4	−14.5	106	127
Sudan	400	600	−0.3	−0.9	2.3	−8.3	106	100

Table 15.1 ***Export and Import Growth and Terms of Trade, 1965–90 (continued)***

	Merchandise trade (millions of dollars)		*Average annual growth rate[a] (per cent)*				*Terms of trade (1987 = 100)*	
	Exports	*Imports*	*Exports*		*Imports*			
	1990	*1990*	*1965–80*	*1980–90*	*1965–80*	*1980–90*	*1985*	*1990*
Middle-income economies	**491 128**	**485 897**	**3.9** ***w***	**3.8** ***w***	**6.1** ***w***	**0.9** ***w***	**110** ***m***	**102** ***m***
Lower-middle-income	**184 340**	**195 680**	**. .**	**7.2** ***w***	**4.7** ***w***	**2.1** ***w***	**110** ***m***	**99** ***m***
Bolivia	923	716	2.7	1.4	5.0	−2.4	167	97
Senegal	783	1 620	2.5	5.6	4.1	4.6	106	106
Philippines	8 681	13 080	4.6	2.5	2.9	2.3	93	93
Côte d'Ivoire	2 600	2 100	5.5	2.7	7.6	−1.2	110	80
Dominican Rep.	734	2 057	0.3	1.3	4.9	3.5	109	98
Papua New Guinea	1 140	1 288	13.0	6.2	1.6	2.6	111	75
Guatemala	1 211	1 626	4.8	−1.7	4.6	−1.4	108	102
Morocco	4 263	6 918	3.7	6.1	6.5	2.9	88	86
Cameroon	1 200	1 300	4.9	−1.3	5.6	−3.3	139	91
Ecuador	2 714	1 862	15.1	4.3	6.4	−3.2	153	109
Syrian Arab Rep.	4 173	2 400	11.4	8.7	8.5	−8.3	125	87
Congo	1 130	570	10.3	5.9	0.6	−3.1	145	99
El Salvador	*550*	1 200	1.0	*−0.8*	2.7	*−0.5*	126	*114*
Paraguay	959	1 113	6.5	10.7	3.7	1.5	108	110
Peru	3 277	3 230	1.6	0.3	−1.4	−4.0	111	78
Jordan	1 146	2 663	11.2	10.3	9.7	−0.5	95	112
Colombia	6 766	5 590	1.4	10.6	5.3	−2.3	140	92
Thailand	23 002	33 129	8.6	13.2	4.1	10.2	91	99
Tunisia	3 498	5 471	10.8	4.8	10.4	1.1	105	99
Jamaica	1 347	1 685	−0.4	0.6	−1.9	1.1	95	88
Turkey	12 959	22 300	5.5	9.1	7.7	−7.0	82	98
Romania	. .	. .	. .	. .	. .	. .	. .	. .
Poland	13 627	9 781	. .	3.0	. .	1.2	94	103
Panama	321	1 539	−5.7	−0.3	−1.9	−3.0	130	138
Costa Rica	1 457	2 026	7.0	3.1	5.7	2.5	111	114
Chile	8 579	7 023	8.0	4.8	1.4	0.6	102	131
Algeria	15 241	10 433	1.8	5.3	13.0	−4.6	174	99
Mauritius	1 182	1 616	3.1	9.6	5.2	11.2	83	114
Malaysia	29 409	29 251	4.6	10.3	2.2	5.6	117	94
Argentina	12 353	4 077	4.7	1.4	1.8	−8.4	110	112
Iran, Islamic Rep.	15 000	13 000	. .	21.1	. .	8.0	160	72
Nicaragua	379	750	2.8	*−5.3*	1.3	*−2.8*	111	*110*

Table 15.1 ***Export and Import Growth and Terms of Trade, 1965–90 (continued)***

	Merchandise trade (millions of dollars)		*Average annual growth rate[a] (per cent)*				*Terms of trade (1987 = 100)*	
	Exports	*Imports*	*Exports*		*Imports*			
	1990	*1990*	*1965–80*	*1980–90*	*1965–80*	*1980–90*	*1985*	*1990*
Upper-middle-income	**306 789**	**290 217**	**3.9 *w***	**1.9 *w***	**7.2 *w***	**0.1 *w***	**111 *m***	**105 *m***
Mexico	26 714	28 063	7.7	3.4	5.7	−1.1	133	110
South Africa	23 612	18 258	7.8	1.7	−0.1	−3.7	105	93
Venezuela	17 220	6 364	−9.5	1.8	8.1	−4.6	174	164
Uruguay	1 696	1 415	4.6	3.2	1.2	−1.1	89	104
Brazil	31 243	22 459	9.3	4.0	8.2	−0.3	92	123
Hungary	9 588	8 646	..	5.5	..	1.3	104	87
Yugoslavia	14 365	18 911	5.6	0.1	6.6	0.6	95	121
Czechoslovakia	17 950	19 862	..	..	..	..	..	..
Gabon	2 471	760	8.6	*1.4*	9.5	*−1.8*	140	*96*
Trinidad and Tobago	2 080	1 262	−5.5	−3.7	−5.8	−12.8	156	110
Portugal	16 416	25 333	3.4	*11.7*	3.7	*8.2*	85	*105*
Korea, Rep.	64 837	69 585	27.2	12.8	15.2	10.8	103	108
Greece	8 053	19 701	11.9	3.8	5.2	4.3	94	105
Saudi Arabia	31 065	24 069	8.8	−9.7	25.9	−10.0	176	95
Iraq	16 809	4 314	..	..	..	..	..	..
Libya	14 285	3 976	3.3	1.8	11.7	−10.4	196	97
Oman	458	2 608	..	..	..	..	..	..
High-income economies	**2 555 661 *t***	**2 725 419 *t***	**7.3 *w***	**4.3 *w***	**4.4 *w***	**5.3 *w***	**97 *m***	**100 *m***
OECD members	**2 379 089 *t***	**2 501 753 *t***	**7.2 *w***	**4.1 *w***	**4.1 *w***	**5.2 *w***	**94 *m***	**100 *m***
Other	**176 573 *t***	**223 666 *t***	**8.8 *w***	**8.3 *w***	**9.8 *w***	**6.7 *w***	**100 *m***	**100 *m***
Ireland	23 796	20 716	10.0	7.3	4.8	3.6	97	95
Israel	12 047	15 197	8.9	7.5	6.2	4.7	105	103
Spain	55 607	87 487	12.4	7.4	4.4	9.0	91	106
Singapore	52 627	60 647	4.7	8.6	7.0	6.7	99	100
Hong Kong	29 002	82 495	9.1	6.2	8.3	*11.0*	97	*100*
New Zealand	9 045	9 466	3.8	3.4	1.1	3.6	88	99
Belgium	118 002	119 725	7.8	4.7	5.2	3.1	94	96
United Kingdom	185 891	224 914	5.1	2.7	1.4	4.9	103	105
Italy	168 523	176 153	7.7	3.5	3.5	4.2	84	97
Australia	35 973	39 740	5.4	3.9	1.0	4.7	111	115
Netherlands	131 479	125 909	8.0	4.4	4.4	3.5	101	102
Austria	41 876	49 960	8.2	6.2	6.1	5.2	87	92
France	209 491	232 525	8.5	3.4	4.3	3.2	96	102
United Arab Emirates	..	..	*13.3*	..	..	..	..	..
Canada	125 056	115 882	5.4	5.9	2.5	8.4	110	109

Table 15.1 ***Export and Import Growth and Terms of Trade, 1965–90 (continued)***

	Merchandise trade (millions of dollars)		*Average annual growth rate[a] (per cent)*				*Terms of trade (1987 = 100)*	
	Exports	*Imports*	*Exports*		*Imports*			
	1990	*1990*	*1965–80*	*1980–90*	*1965–80*	*1980–90*	*1985*	*1990*
United States	371 466	515 635	6.4	3.3	5.5	7.6	100	100
Denmark	34 801	31 562	5.4	5.1	1.7	4.2	93	104
Germany	397 912	341 248	7.2	4.2	5.3	3.9	82	97
Norway	34 072	26 889	8.2	7.2	3.0	2.5	130	91
Sweden	57 326	54 536	4.9	4.4	1.8	3.5	94	101
Japan	286 768	231 223	11.4	4.2	4.9	5.6	71	91
Finland	26 718	27 098	5.9	3.0	3.1	4.7	85	98
Switzerland	63 699	69 427	6.2	3.5	4.5	3.8	86	100
Kuwait	*8 300*	*4 800*	*18.5*	*−11.1*	*11.8*	*−5.7*	*175*	*77*

w stands for weighted average
m stands for mean value
Source: *World Development Report, 1992.*

which they trade with the developed countries are favourable. There is no dispute that there are both static and dynamic gains from trade. What is in dispute is whether the overall gains could not be greater, and the distribution of gains between countries fairer, if the pattern of trade was different from its present structure and the developed countries were to modify their trading policies towards the developing world.

If the price elasticity of demand for the exports of developing countries is low, and demand is slow in expanding, it would seem counter-productive to allocate factors of production to existing export activities. The effect of increased output would be to reduce prices and worsen the terms of trade. This is the notion of 'immiserising growth', with adverse movements in the terms of trade outweighing the gains from a larger volume of production.[1] So what are the developing countries to do? The answer would appear to be industrialisation – the production of industrial goods with a higher price and income elasticity of demand, either for export or for the home market, the latter implying import substitution. These dynamic considerations relating to the demand for existing export products and the utilisation of increases in factor supplies do not diminish the case for international specialisation. What is involved is a reconsideration of what lines of activity to pursue in the face of changed circumstances, and a recognition of the distinction between **established comparative advantage** and **incremental comparative advantage**. Before going on to consider trade strategy for developing countries in the light of these 'new' trade theories, let us first establish more firmly the static and dynamic gains from trade stressed by traditional theory.

■ The Gains from Trade

While it is quite legitimate to look at trade from the point of view of the balance of payments, and to regard the balance of payments as a development problem that can only be solved by new trade policies, the benefit from trade in traditional trade theory is not measured by the foreign exchange earned but by the increase in the value of output and real income from domestic resources that trade permits. Optimal trade policy, measured by the output gains from trade, must be clearly distinguished from the maximisation of foreign exchange earnings.

---

[1] This is the basis of J. Bhagwati's (1958) model of immiserising growth.

The gains from trade can be divided into static and dynamic gains. The **static gains** are those which accrue from international specialisation according to the doctrine of comparative advantage. The **dynamic gains** are those which result from the impact of trade on production possibilities at large. Economies of scale, international investment and the transmission of technical knowledge would be examples of dynamic gains. In addition, trade can provide a **vent for surplus** commodities, which brings otherwise unemployed resources into employment, and also enables countries to purchase goods from abroad, which can be important for two reasons. The first is that if there are no domestic substitutes, the ability to import can relieve domestic bottlenecks in production. The second is that imports may simply be more productive than domestic resources.

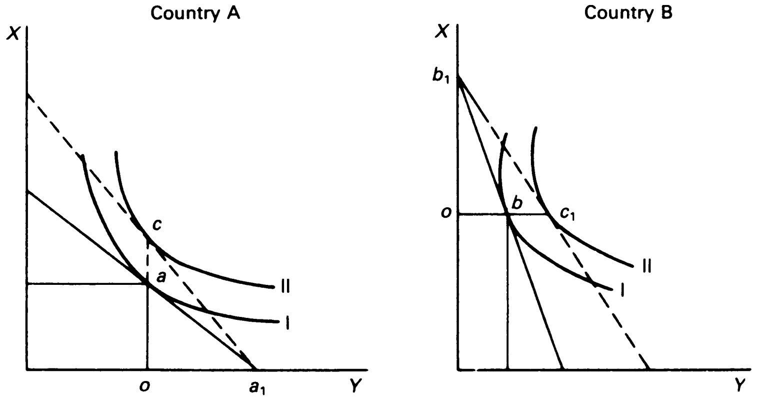
In this chapter we must do two things. First, we must establish the precise nature of the benefits of trade, and second we must examine critically the underlying assumptions of the comparative advantage doctrine and the classical advocacy of international specialisation and free trade. We can then go on to consider the argument that the balance-of-payments implications of international specialisation and free trade may seriously offset the allocative gains from trade, and whether this establishes a case for protection.

■ The Static Gains from Trade

The static gains from trade are based on the **law of comparative advantage**. Consider the case of two countries A and B both with the capacity to produce commodities X and Y. The simple proposition of classical trade theory is that if country A has the comparative advantage in the production of commodity X, and country B has the comparative advantage in the production of commodity Y, it will be *mutually* profitable for country A to specialise in the production of X and for country B to specialise in the production of Y, and for surpluses of X and Y in excess of domestic needs to be freely traded, provided that the international rate of exchange between the two commodities lies between the domestic rates of exchange. Comparative advantage is an opportunity-cost concept measured by the marginal rate of transformation between one commodity and another as given by the slope of the production-possibility curve. Given perfect competition, which the above analysis assumes, the domestic price ratio between two commodities will equal their marginal rate of transformation. If this were not so, it would pay producers to switch from one commodity to another to take advantage of the relatively favourable price ratio.

Now let us give a practical example of the static gains from trade. In **Figure 15.1**, the production-possibility curves for countries A and B are drawn showing the different combinations of the two goods X and Y that can be produced with each

Figure 15.1



country's given factor endowments. We assume for simplicity that factors of production in both countries are sufficiently versatile as to be able to produce either commodity equally efficiently so that the production-possibility curves are linear; that is, there is a constant marginal rate of transformation. Curves I and II are indifference curves showing levels of community welfare.

Now suppose that the marginal rate of transformation between *X* and *Y* in country A is 10/8, and in country B, 10/2. Commodity *X* is relatively cheaper in country B than A measured by the amount of commodity *Y* that must be forgone, and *Y* is relatively cheaper in country A. We say that country A has the comparative advantage in the production of Y, and country B in the production of *X*, and that it will be mutually advantageous for A to concentrate on *Y*, and B on *X*, and for A to swop *Y* for *X* and for B to swop *X* for *Y*.

Before trade each country produces combinations of goods *X* and *Y* which give a level of utility represented by indifference curve I. The two countries produce at *a* and *b* respectively. With the opening of trade there can only be one price ratio between *X* and *Y* determined by the interaction of demand and supply in both countries together, and which will lie somewhere between each country's transformation (price) ratio. Assume that the international rate of exchange settles at 10/5, shown by the broken lines in **Figure 15.1**. Country A, specialising in the production of *Y*, can exchange *Y* for more *X* internationally than it could domestically, and country B, specialising in the production of *X*, can exchange *X* for more *Y* internationally than it could domestically. For example, suppose after trade production in country A shifts to a_1 and in country B to b_1. Country A, trading oa_1 of Y, can now consume *oc* of X which it obtains from country B. Country B, trading ob_1 of *X*, can now consume oc_1 of *Y* which it obtains from country A. Both countries move to higher indifference curves, to higher levels of welfare on indifference curve II.

As a result of the international division of labour world production increases, and so does world welfare. Specialisation on the basis of comparative advantage enables the maximum to be produced from a given amount of factor resources. The increase in welfare that trade permits results from the opportunity to obtain foreign products more cheaply, in terms of real resources forgone, than the alternative of import substitution which means domestic production. In Hicks's beautifully concise phrase, 'the gain from trade is the difference between the value of things that are got and the value of things that are given up' (Hicks (1959), p. 181). Through the international division of labour one is supposed to get more than one gives up! If comparative advantage was exactly the same in the two countries there would, of course, be no static gains and the justification for trade would be to reap economies of scale and other dynamic gains.

Whether the consumption of *both* commodities in *both* countries rises depends on the international rate of exchange. At some rates of exchange, even between the two domestic price ratios, the consumption of one of the commodities in one of the countries after trade may be less than before trade. Even so, it can still be maintained that the post-trade position is superior to the pre-trade position, if those individuals whose welfare is increased can fully compensate those who suffer and still be better off.

The static gains from trade are the same gains as from trade creation that accrue with the establishment of customs unions, when high-cost suppliers are replaced by lower-cost suppliers. It is the doctrine of comparative costs that provides the rationale for the increasing advocacy of the formation of customs unions, or trading areas, between developing countries. It should be emphasised, though, that there is nothing in the comparative cost doctrine that ensures equality in the distribution of gains from trade creation (which explains, in part, why attempts in East Africa and the West Indies to establish free-trade areas met with difficulties).

There is also the important question of whether the full employment of resources can be maintained in each country. The classical doctrine of free trade assumes that all commodities are produced under conditions of constant returns to scale and that the full employment of resources is maintained as resources are switched from one activity to another in accordance with comparative advantage. If some activities, such as primary commodities, are subject to diminishing returns, however, there is a limit to employment in these activities, and it is possible that the real income gains from specialisation will be offset by the real income losses from unemployed resources.

If industrial activities are subject to increasing returns, trade will lead to the unequal accumulation of resources between primary producing and industrial countries, and be a force perpetuating inequality, as we saw in Chapter 5.

■ The Dynamic Gains from Trade

Now let us turn to the dynamic gains from trade. The major dynamic benefit of trade is that export markets widen the total market for a country's producers. If production is subject to increasing returns, the total gains from trade will exceed the static gains from a more efficient allocation of resources. With increasing returns to scale, any country may benefit from trade irrespective of the terms of trade. Hicks (1959) has argued that it is impossible to make sense of the phenomenon of international trade unless one lays great stress upon increasing returns owing to the close connection between increasing returns and the accumulation of capital. For a small country with no trade there is very limited scope for large-scale investment in advanced capital equipment; specialisation is limited by the extent of the market. But if the poor developing country can trade, there is some prospect of industrialisation and of dispensing with traditional methods of production. The larger the market, the easier capital accumulation becomes if there are increasing returns to scale. In this respect large countries, like India, are in a more favourable position than smaller countries, such as Sri Lanka or Jamaica. India's large population offers a promising basis for the establishment of capital-goods industries and the production of manufactured goods, since production can take place on a viable basis before trade. The smaller country, however, may need substantial protection for a commodity before it can be produced economically and compete in world markets. At least sixty countries classified as 'developing', however, have populations of less than 15 million. Other important dynamic effects of trade consist of the stimulus to competition, the acquisition of new knowledge, new ideas and the dissemination of technical knowledge, the possibility of accompanying capital flows, increased specialisation leading to more roundabout methods of production, and changes in attitudes and institutions. In terms of **Figure 15.1**, the effect of dynamic benefits is to shift outwards the production-possibility curves of both countries leading to a higher level of community welfare.

■ Trade as a Vent for Surplus

Another important potential gain from trade is the provision of an outlet for a country's surplus commodities which would otherwise go unsold and represent a waste of resources. This is the so-called 'vent for surplus' gain from trade. In **Figure 15.1** this is represented by a movement from a point inside the production-possibility frontier to a point on the frontier – which represents a higher level of welfare. For there to be a gain implies that the 'surplus' export resources have no alternative uses and could not be switched to domestic use. This may not be as unreasonable an assumption as it sounds, bearing in mind the country's resource endowments in relation to its population size and the tastes of the community. Mines and fishing grounds, for example, have no alternative uses, and the marginal utility of consuming their products would soon become zero if demand was confined to domestic consumption alone. As a theory of trade, Myint (1958) has argued that the vent for surplus theory is a much more plausible theory than the comparative cost doctrine in explaining the rapid expansion of export production in most parts of the developing world in the nineteenth century. First, had there not been unutilised resources the expansion process could not have kept going. Second, the comparative cost theory cannot explain why, when two countries are similar, one develops a major export sector while the other does not; vent for surplus (related to relative population pressures) is one possible explanation. Third, vent for surplus is a much more plausible explanation for the start of trade. It is difficult to believe that small-scale peasant farmers with no surplus would start specialising according to the law of comparative advantage in the anticipation of reaching a higher consumption-possibility curve. In response to Myint's arguments there is a distinction to be made here between the *type* of commodity traded and the *basis* for trade in the sense of what gets trade started. Vent for surplus may explain better the original basis of trade, while comparative cost theory explains the type of commodity traded. Vent for surplus has no explanatory power in this latter connection.

Finally, a fourth potential gain from trade, which merits distinguishing as a separate effect, is that exports permit imports which may be more productive than domestic resources both directly and indirectly. We saw in the discussion of dual-gap analysis in Chapter 14 that imports can be regarded as substitutes for domestic capital goods with the capacity to lower the overall capital–output ratio through their superior efficiency and impact on the economy at large, especially by relieving domestic bottlenecks. In this sense exports have supply effects as well as demand effects which it is important to take into account in considering the relation between exports and growth.

■ Export-Led Growth

Historically, David Ricardo (1772–1823) was the founder of the comparative cost, classical free-trade doctrine. Before him Adam Smith (1723–90) had stressed the importance of trade as a vent for surplus and as a means of widening the market, thereby improving the division of labour and the level of productivity. According to Smith:

> between whatever places foreign trade is carried on, they all of them derive two distinct benefits from it. It carries out the surplus part of the produce of their land and labour for which there is no demand among them, and brings back in return for it something else for which there is a demand. It gives a value to their superfluities, by exchanging them for something else, which may satisfy a part of their wants and increase their enjoyments. By means of it, the narrowness of the home market does not hinder the division of labour in any particular branch of art or manufacture from being carried to the highest perfection. By opening a more extensive market for whatever part of the produce of their labour may exceed the home consumption, it encourages them to improve its productive powers and to augment its annual produce to the utmost, and thereby to increase the real revenue of wealth and society (Smith (1776)).

In the nineteenth century Smith's productivity doctrine developed beyond a free-trade argument into an export-drive argument, particularly in the colonies. This partly explains why some critics have associated the classical theory of trade with colonialism, and why Smith has been attacked and not Ricardo, the official founder of classical free-trade theory.

J. S. Mill (1806–73) rejected Smith's vent for surplus argument on the grounds that resources are mobile. But Mill did accept the importance of the dynamic-effects of trade (what he called indirect effects) and he also stressed the favourable effect of imports on work effort (the international demonstration effect in modern parlance).

The development literature abounds with models of **export-led growth**, and it is claimed that both historically and in the contemporary world economy, trade has been the engine of growth. Chenery and Strout (1966) remark that there is almost no example of a country which has for a long period sustained a growth rate substantially higher than its growth of exports, and the Pearson Commission (1969) claimed that the growth rates of individual developing countries since 1950 correlate better with their export performance than with any other single economic indicator. We have given reasons why this might be so. In modern times countries such as Singapore, Japan, South Korea and Hong Kong have certainly achieved remarkable growth by the export of manufactures, and historically there seems to be a consensus among economic historians that in the nineteenth century trade acted as an engine of growth, not only in that it contributed to a more efficient allocation of resources within countries, but because it transmitted growth from one part of the world to another. The demand in Europe, and in Britain in particular, for raw materials brought prosperity to such countries as Canada, Argentina, South Africa, Australia and New Zealand. As the demand for their commodities increased, investment in these countries also increased. Trade was mutually profitable. Alfred Marshall wrote in the nineteenth century: 'the causes which determine the economic progress of nations belong to the study of international trade' (Marshall (1890)). One of the foremost contemporary exponents of trade as the engine of growth was Arthur Lewis, who bases his theory on what appears to be from his researches a stable relationship between economic growth in developed countries and export growth in developing countries (see, for example, Lewis (1980)).

There are two main categories of model of export-led growth. The first relates to the possibility that export growth may set up a virtuous circle of growth, such that once a country is launched on the path, it maintains its competitive position in world trade and performs continually better relative to other countries. This type of model can be used to explain geographic dualism in the world economy, and we articulated such a model in Chapter 5. The second category of model stresses that export growth relieves a country of a balance-of-payments constraint on demand, so that the faster exports grow, the faster output growth can be without running into balance-of-payments difficulties. This type of model is developed in the next chapter on the balance of payments and growth.

The statistical evidence for today's developing countries is not unequivocal, but in general it supports the hypothesis that the growth of exports plays a major part in the growth process by stimulating demand and encouraging saving and capital accumulation, and, because exports increase the supply potential of the economy, by raising the capacity to import. Some studies of the role of exports examine the export–growth relation directly, others the import–growth relation.

The export–growth studies are of two types: time-series for individual countries; and cross-section taking a sample of countries at a point in time. In a fifty-country cross-section study, Emery (1967) found a strong relation taking average values of *per capita* income growth and export growth over the period 1953–63. Syron and Walsh (1968) divided Emery's sample into 'developed' and 'less developed' countries and found the relation to be strong in both groups of countries. In a twenty-country study for the period 1961–6 Stein (1971) found a strong relation between both exports and imports and growth. The correlation between imports and growth is slightly higher than between exports and growth but both correlations are significant at the 95 per cent confidence level. Maizels (1968) has related output growth to export growth for sixteen countries over the period 1953–62, and estimates the equation $y = a + 0.55(x)$, $r^2 = 0.47$. He concludes that the relation is not particularly strong; on the other hand, he finds a strong time-series relation between exports and growth *within* countries. So, too, does the most recent work of Salvatore and Hatcher (1991) who take 26 countries over the years 1963 and 1985, and find the export growth variable significantly positive in 16 of the countries.

The South East Asian countries of Japan, South Korea, Taiwan, Singapore and Hong Kong provide classic case studies of export-led growth, as do Germany and Italy among developed countries in the 1950s and 1960s.

Studies have also been done of the direct effect of exports on savings. Exports are important for saving not only through their effects on output but also because the export sector tends to have a higher propensity to save than the rest of the economy. Exports, especially of primary commodities, tend to produce highly concentrated incomes which raises the level of saving for any given aggregate level of income. Also it should be remembered that government saving relies heavily on export taxes in many developing countries.

Maizels (1968) has fitted the savings function, $S = a_0 + b(Y - X) + c_0(X)$, where Y is gross national product and X is export earnings, to data for eleven countries. In eight out of the eleven countries he finds that export earnings contributed significantly to savings. Lee (1971) has extended Maizel's analysis taking twenty-eight countries for a longer time period. Maizels's results are further supported, and Lee finds the coefficient on X substantially higher than on $Y - X$ for many countries. Chenery and Eckstein (1970) and Papanek (1973) obtain similar results for different samples and different time periods.

The Disadvantages of Free Trade for Development

Now let us consider the potential disadvantages of adherence to the comparative cost doctrine. Like most micro-welfare theory, the comparative advantage/free-trade argument is a static one based on restrictive, and very often unrealistic, assumptions. As a criterion for the international allocation of resources it suffers from the same static defects as the investment criteria of traditional micro-economic theory that were discussed in Chapter 7. There may, in short, exist a conflict between short-run allocative efficiency and long-run growth. The doctrine assumes, for example, the existence of full employment in each country (otherwise there would be no opportunity cost involved in expanding the production of commodities); it assumes that the prices of resources and goods reflect their opportunity cost (i.e. that perfect competition exists), and that factor endowments are given and unalterable. Moreover, the doctrine ignores the effect of free trade on the terms of trade (movements in which affect real income), and the dynamic feedback effects that trade itself might have on comparative advantage. As a result, it can be argued that the principles of comparative advantage and free trade are not very useful concepts to employ in the context of developing countries which are in the throes of rapid structural change and which are concerned more with long-term development than with short-term efficiency. As many economists have commented, the doctrine of comparative advantage is more useful in explaining the past pattern of trade than for providing a guide as to what the future pattern of trade should be as a stimulus to development.

The question is not whether there should be trade but whether there should be free trade, as the doctrine of comparative costs implies. Might the long-run needs of the developing countries not be better served by protection? Those who question the assumptions of the comparative cost model, and who stress the relation between development and the balance of payments, express the view that the efficiency gains from free trade are unlikely to offset the tendency in a free market for the comparative position of developing countries to deteriorate *vis-à-vis* the developed countries. Free trade is claimed to work to the disadvantage of the developing countries largely because of the nature of the products which these countries seem destined to produce and trade under such a system. The answer is said to lie in a change in the structure of production and exports of the developing countries, which can only be fostered by the protection of new industries in the early stages of their development.

The development considerations that the doctrine of free trade overlooks are numerous. First, it ignores the balance-of-payments effects of free trade and the effect of free trade on the terms of trade. If the demands for different commodities grow at different rates owing to differences in their price and income elasticity of demand, free trade will work to the benefit of some countries and to the relative detriment of others. In short, free trade cannot be discussed independently of the balance-of-payments and the terms of trade. In classical theory, Viner (1953, p. 39) quotes Torrens, J. S. Mill, Marshall, Edgeworth and Taussig as conceding that unilateral substitution by a country of free trade for protection would move the terms of trade against the country. But most 'free-traders' ignored the subject. In general, the implicit assumption was that movement from protection to free trade would not alter the commodity terms of trade, or if it did that the gains from trade would more than offset any unfavourable terms of trade effect. If the terms of trade effect does offset the gains from trade, this would appear to provide a valid argument for protection. This is one of the lines that modern protectionists take. The case for protection of manufactured goods produced by developing countries is greater: the less the demand for existing primary products is expected to grow and the lower the price elasticity; the higher the internal elasticity of demand for manufactured products from the outside world, and the less the likelihood of retaliation by other countries.

A second factor which the free-trade doctrine tends to overlook is that some activities are subject to increasing returns while others are subject to diminishing returns. The commodities most susceptible to diminishing returns are primary products, where the scope for technical progress is also probably less than in the case of manufactured goods. This being so, one might expect a rise in the ratio of primary to manufactured good prices, and diminishing returns would not matter so much if the goods were price inelastic. In practice, however, there has been a substitution of synthetic substitutes for primary products, and the terms of trade have deteriorated (see later) partly because of substitution and partly because of the fact that the demand for primary commodities in general, in relation to supply, has expanded much less than in the case of manufactured commodities. But whatever the movement in the terms of trade, it is somehow perverse to recommend a trade and development policy based on activities subject to diminishing returns, particularly in the light of the theory of cumulative causation that we discussed in Chapter 5.

A third disadvantage of adherence to the comparative advantage doctrine is that it could lead to excessive specialisation on a narrow range of products, putting the economy at the mercy of outside influences. The possibility of severe balance-of-payments instability resulting from specialisation may be damaging to development.

Fourth, comparative cost analysis glosses over the fact that comparative advantage may change over time, or that it could be changed by deliberate policies for the protection of certain activities. There is no reason why countries should be condemned to the production and export of the same commodities for ever. If comparative advantage is not given by nature, as the doctrine of free trade seems to suggest, but can be altered, the case for protection is strengthened.

It should also be remembered that the concept of comparative advantage is based on calculations of private cost. But we have seen in Chapter 8 that in developing countries social costs may diverge markedly from private costs, and that social benefit may exceed the private benefit because of externalities. If private costs exceed social costs in industry (because wage rates are artificially high, for example), and social benefits from industrial projects exceed private benefits, there is a strong argument for protecting industry in order to encourage the transfer of labour from other activities into industry to equate private and social cost and private and social benefit.

Last, it may be mentioned that the export growth of some activities has relatively little secondary impact on other activities. Primary commodities fall into this category. The evidence is abundant that the export growth of primary commodities has not had the development impact that might be expected from the expansion of industrial exports. The reasons are not hard to understand. Primary production has very few backward or forward linkages; and, historically, it has tended to be undertaken by foreign enterprise with a consequent outflow of profits. The secondary repercussions of the pattern of trade also tend to be overlooked by the free-trade doctrine.

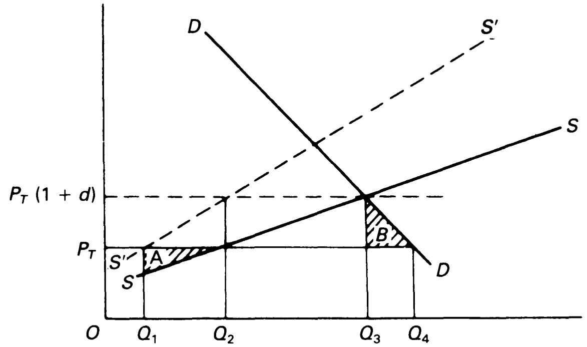
Tariffs *vs* Subsidies as a Means of Protection

We have seen that there are benefits from trade, but that it does not follow that the freer trade is the better. There are many disadvantages that the doctrine of free trade overlooks when trade is looked at in a long-run development context, as opposed to the static short-run context of the doctrine of comparative advantage. Furthermore, free trade does not guarantee an equal distribution of the gains from trade, and this is an important consideration for countries who naturally look to their relative position compared to others, and not only at their absolute performance.

We can summarise the **arguments for protection** as follows (see Johnson (1964)). First there is a category of purely economic arguments that comprise all those arguments for protection as a means of increasing real output or income above what it would otherwise be. These include: (i) the infant industry argument, to allow industries to reap their optimum size in terms of minimum average cost of production; (ii) the existence of external economies in production, where the social cost of production is less than the private cost; (iii) distortions in the labour market, which make the social cost of using labour less than the private cost; and (iv) international distortions which cause the domestic rate of transformation between goods to diverge from the foreign rate of transformation due, for example, to monopoly power in international trade. This argument for protection is often referred to as the optimum tariff argument.

Into this category of economic arguments might also be put two factors previously stressed: first terms-of-trade deterioration, and secondly balance-of-payments difficulties arising from the pattern of trade. Now Johnson has argued (1964), and others of neoclassical persuasion, that these are non-economic arguments. In the case of the terms of trade, the restriction of import supply will not reduce import prices for a small country. In the case of the balance of payments, equilibrium can be achieved automatically by allowing the exchange rate to fluctuate freely. The terms of trade argument may be correct, but the balance of payments argument suffers from the confusion between a balance-of-payments equilibrium on current account which affects the real economy, and balance in the foreign exchange market. The two are not the same. A floating exchange rate will equilibriate the foreign exchange market by definition, but will not necessarily equilibrate the balance-of-payments on current account. If both terms-of-trade deterioration and balance-of-payments difficulties constrain growth and lead to unemployment, the social cost of labour will be less than the private cost which is a domestic distortion, which is an economic argument for protection.

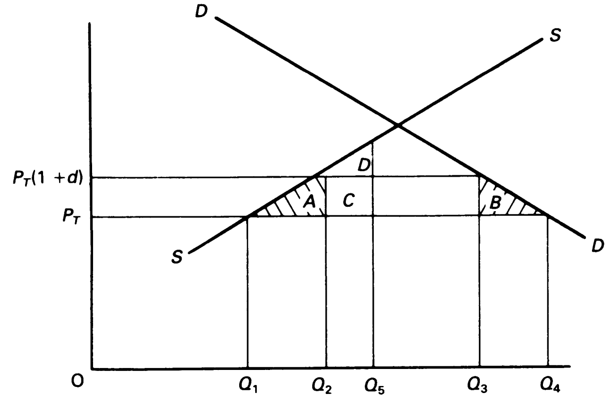
Figure 15.2



Secondly, there is a category of non-economic arguments for protection which comprise arguments for protection for its own sake rather than to increase output or income above what it would otherwise be. For example, industrialisation at any price, or self sufficiency for strategic reasons, would be arguments of this type.

Having summarised the arguments for protection, the question then is what is the best means of protection? It can be shown that tariffs are appropriate only under special circumstances: these are where distortions are international (the optimum tariff argument) and when self-sufficiency is the objective. All other arguments for protection are arguments for subsidies, the reason being that where distortions are domestic a tariff will introduce further distortions and according to the theory of the second best there is no knowing *a priori* whether the situation will be made better or worse off. Let us illustrate the argument with a diagram. Consider **Figure 15.2** where we have a good producible domestically but subject to a domestic distortion such that the private cost of production (*S'S'*) is *d* per cent above the social cost (*SS*). The demand curve is *DD* and the good is also importable at the international price P_T. Under free trade, domestic producers will produce OQ_1, and Q_1Q_4 will be imported. Q_1Q_2 imports could be replaced, however, by additional domestic production, with real savings equal to the shaded area A, if domestic producers were given a subsidy of

Figure 15.3



d per cent. The same real income gain could be achieved by a tariff of the same percent, but because the domestic price rises to $P_T(1 + d)$, there will be a loss of consumer surplus equal to the shaded area B owing to the restriction of consumption by Q_3Q_4. The loss of consumer surplus may be greater than the real income gain, reducing total welfare. The balance of advantage depends on the relative slopes of the supply and demand curves. In these circumstances a subsidy to labour is unequivocally first best.

Now let us consider the relative merits of tariffs and subsidies where the arguments for protection are non-economic. Suppose, for example, the objective of protection is simply to increase domestic output. Here subsidies are also superior to tariffs because tariffs impose a consumption cost and add nothing more to the achievement of increased production. Consider **Figure 15.3**. We assume that there is no domestic distortion so that the *SS* curve represents both the private and social cost of production. Now suppose the object is to raise domestic production from Q_1 to Q_2. This can be done with a tariff or subsidy of *d* per cent which uses extra resources equal to the shaded area *A*. The tariff, however, imposes an extra consumption cost equal to area *B* as a result of a rise in the price from P_T to $P_T(1 + d)$.

On the other hand, if the objective is self-sufficiency and a cut-back in imports we can show that tariffs are least costly; the reason being that it is more efficient to reduce imports by restricting consumption and increasing domestic production together than by either increasing production or reducing consumption alone. Consider **Figure 15.3** again. A tariff of *d* per cent reduces imports to Q_2Q_3 at a cost of $A + B$. To get the same reduction with a subsidy requires a subsidy in excess of *d* per cent in order to induce extra domestic production Q_2Q_5 (equal to the cut-back in consumption through the tariff of Q_3Q_4). This involves an extra cost equal to the area $C + D$. Since $C > B$, the cost of the subsidy policy is obviously greater than the cost of the tariff.

If subsidies are first-best they may be effectively granted by exemption from taxation. If this is exemption from existing taxes, this will have revenue implications for the government budget. In the long run, however, subsidies can be 'self-financing' by the increased output they stimulate.

A further argument against tariffs and in favour of subsidies is that tariffs are very 'inward-looking', whereas protection through subsidies is much more 'outward-looking'. Tariffs adjust the internal price structure to the internal cost structure. This may lead to inefficiencies and make it difficult for exports to compete when the effect of import substitution policies runs out. Subsidies, by contrast, adjust the internal cost structure to the external price structure and make it possible for exports to compete more easily in world markets. This leads us to the debate over 'inward-looking' import substitution development strategy versus 'outward-looking' export promotion strategy.

Import Substitution *vs* Export Promotion

In the early stages of production, the protectionist strategy of import substitution using tariffs is undoubtedly the easiest and many countries have pursued it, particularly in Latin America.[1] However, there are different stages of import substitution, some easier than others. The first easy stage involves the replacement by domestic production of imports of non-durable consumption goods, such as clothing, footwear, leather and wood products. Countries in the early stages of industrialisation are naturally suited to these products and relatively little protection is required. Once this stage is over, the maintenance of high growth rates then requires the import substitution of other goods if the strategy is to be continued. The problem with this second stage of import substitution is that relatively high rates of protection are required, because intermediate goods such as steel and producer durables are subject to substantial economies of scale, both internal and external, so that unit costs are very high if output is low. The problem with high rates of protection is that they breed inefficiency, and more importantly act as a tax on exports by keeping costs and the exchange rate high. The catalogue of costs and distortions introduced by protective import-substitution policies is formidable. In a major study of industry and trade in seven developing countries, Little, Scitovsky and Scott (1970) argue that import substitution tends to shift the distribution of income in favour of the urban sector and the higher income groups with a higher propensity to import, thereby worsening the balance of payments. Protection taxes agriculture since it raises the price of industrial goods relative to agricultural goods. Furthermore, since protection maintains an artificially high exchange rate it reduces receipts in terms of domestic currency from a given quantity of agricultural exports, which may discourage agricultural exports. Import substitution may also worsen unemployment by encouraging capital-intensive activities.

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[1] For surveys of import substitution strategy see Bruton (1970) and Hirschman (1968).

Despite the dangers of this second stage of import substitution, this is the strategy that many Latin American, South East Asian and Eastern European countries adopted in the immediate post-war years. The consequence was that the exports of manufacturers were discouraged and the terms of trade turned against agriculture *within* the countries, discouraging agricultural output and reducing the growth of demand for industrial products internally. In the 1960s reforms were undertaken in several countries, but there was a distinct difference in emphasis and approach between Latin America and South-East Asia. In Latin America there was a general move towards more 'outward-looking' policies which favoured both export promotion and domestic production. Although subsidies were given to export, however, exporters were still required to use domestic inputs produced under protection, and the subsidies were generally insufficient to provide incentives to exports comparable to the protection of domestic markets, and thus there has been a continued bias in favour of import substitution. In South East Asia by contrast, the policy has been one of relentless export expansion – in Japan, South Korea, Singapore and Taiwan. In the last three countries, the incentive system has consisted of exporters being exempted from indirect taxes on output and inputs and from duties on imported inputs. Tax holidays, and other tax concessions on profits from exports, have also been offered.

Balassa (1980 for summary) has amassed considerable evidence to show that export performance is positively related to the degree of incentives, taking the growth of exports and changes in the ratio of exports to output. He also finds that the capital–labour ratio tends to be lower in export industries than in import-substitute activities and that export industries are generally more labour-intensive. Both the foreign exchange constraint and the savings constraint have been eased by export promotion, and foreign investment has also been encouraged. It is these favourable effects, concludes Balassa, that have produced a positive correlation between exports and economic growth.

In 1987 the World Development Report of the World Bank classified a group of 41 developing countries according to their trade orientation to compare the performance of countries with different degrees of outward/inward orientation. Four categories of countries were identified: (i) **strongly outward oriented** countries, where there are very few trade or foreign exchange controls in which trade and industrial policies do not discriminate between production for the home market and exports, and between purchases of domestic goods and foreign goods – in other words, there is a policy of trade neutrality; (ii) **moderately outward oriented** countries, where the overall incentive structure is moderately biased towards the production of goods for the home market rather than for exports, and favours the purchases of domestic goods; (iii) **moderately inward oriented** countries, in which there is a more definite bias against exports and in favour of import substitution; (iv) **strongly inward oriented** countries, in which trade controls and the incentive structures strongly favour production for the domestic market and discriminate strongly against imports. Some countries may lie on the borderline between categories, or switch categories through time, but the distinction between the strongly outward and inward oriented categories is clear-cut, and the World Bank find the economic performance of the countries in the strongly outward oriented category markedly superior.

New Trade Theories for Developing Countries: The Prebisch Doctrine[1]

Raùl Prebisch was one of the first development economists to question the mutual profitability of the international division of labour for developing countries on existing lines. Prebisch is one of those who looks at the relation between trade and development from the standpoint of the balance of payments rather than real resources. His major claim is that the unfavourable impact of unrestricted trade on the terms of trade and balance of payments of developing countries far outweighs any advantages with respect to a more efficient allocation of resources. His concern is with two distinct, but not unrelated, phenomena. One is the transference of the benefits of technical progress from the developing to the developed countries. The second is the balance-of-payments effects of differences in the income elasticity of demand for different types of products. He divides the world into industrial 'centres' and 'peripheral' countries and then conducts his analysis within the framework of the traditional two-country, two-commodity case of international trade theory – equating the developing countries with primary producers (the 'periphery') and the developed countries with secondary producers (the 'centre').

Technical Progress and the Terms of Trade

As we said earlier, in theory the barter terms of trade might be expected to move in favour of the developing countries. For one thing, primary-product production tends to be subject to diminishing returns, and for another technical progress tends to be more rapid in manufacturing industry than in agriculture. If prices are related to costs one would expect in theory the ratio of primary-product prices to industrial-good prices to rise. According to Prebisch, however, the ratio has shown a long-run tendency to fall. He advances two explanations for this and hence why the benefits of technical progress tend to flow from the developing to developed countries and not the other way round. His first explanation concerns the relation between incomes and productivity. He suggests that whereas factor incomes tend to rise with productivity increases in developed countries, they rise more slowly than productivity in the developing countries owing to population pressure and surplus manpower. Thus there is a greater upward pressure on final goods' prices in developed than in developing countries, causing the ratio of prices to move in the opposite direction to that suggested by the pace of technical progress. The second explanation is that a ratchet effect operates with primary product prices *relative* to manufactured goods' prices falling during cyclical downturns by more than they rise *relative* to the prices of manufacturers on the upturns. Such asymmetrical cycles, illustrated in **Figure 15.4**, would produce a secular trend deterioration.[2] Furthermore, according to Prebisch, not only do

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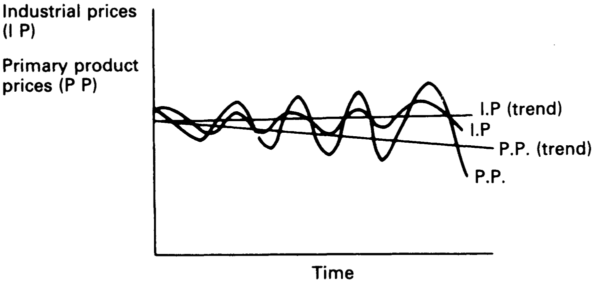
[1] Prebisch (1950). See also his later work (1959). For an excellent evaluation of the Prebisch thesis, see Flanders (1964).

[2] For an empirical investigation of the asymmetry hypothesis, see Thirlwall and Bergevin (1985). As it happens, the hypothesis does not seem to be supported in the years since the Second World War. See p. 373 for further discussion.

Figure 15.4



the terms of trade deteriorate, but if prices must be reduced to clear the market, export earnings will fall if the demand for primary commodities is price inelastic. This is a related sense in which technical progress is 'transferred' from the developing countries to the industrial 'centres'.

The Income Elasticity of Demand for Products and the Balance of Payments

The second phenomenon mentioned by Prebisch is the balance-of-payments effects of differences in the income elasticity of demand for different types of products. It is generally recognised and agreed that the income elasticity of demand for most primary commodities is lower than that for manufactured products. On average, the elasticity is probably less than unity, resulting in a decreasing proportion of income spent on those commodities (commonly known as Engel's Law). In the two-country, two-commodity case the lower-income elasticity of demand for primary commodities will mean that for a given growth of world income the balance of payments of primary-producing, developing countries will *automatically* deteriorate *vis-à-vis* the balance of payments of developed countries producing and exporting industrial goods. A simple example will illustrate the point (see also Chapter 5).

Suppose that the income elasticity of demand for the exports of the developing countries is 0.8 and that the growth of world income is 3.0 per cent: exports will then grow at 2.4 per cent. Now suppose that the income elasticity of demand for the exports of developed countries is 1.3 and the growth of world income is 3.0 per cent; exports of developed countries will then grow at 3.9 per cent. Since there are only two sets of countries, the developing countries' exports are the imports of developed countries and the exports of developed countries are the imports of the developing countries. Thus developing countries' exports grow at 2.4 per cent but imports grow at 3.9 per cent; developed countries' exports grow at 3.9 per cent and imports at 2.4 per cent. Starting from equilibrium, the balance of payments of the developing countries automatically worsens while the developed countries show a surplus. This has further repercussions on the terms of trade. With imports growing faster than exports in developing countries, and the balance of payments deteriorating, the terms of trade will also deteriorate through depreciation of the currency, which may cause the balance of payments to deteriorate even more if imports and exports are price inelastic.

Moreover, this is not the end of the story if we take the *per capita* income growth between developed and developing countries. If population growth is faster in developing countries, the growth of income must also be faster than in the developed countries if *per capita* income growth rates are to remain the same. This will mean an even faster growth rate of imports into developing countries and a more serious deterioration in the balance of payments. And if the goal is to *narrow* relative or absolute differences in *per capita* income between developed and developing countries, the balance-of-payments implications will be even more severe. In the example previously given, which ignores differences in population growth, it is easily seen that the price of balance-of-payments equilibrium is slower growth for the developing countries. If their exports are growing at 2.4 per cent, import growth must be constrained to 2.4 per cent which means that with an income elasticity of demand for imports of 1.3, income growth in the developing countries must be restrained to 2.4/1.3 = 1.85 per cent for balance-of-payments equilibrium. In the absence of foreign borrowing to bridge the foreign exchange gap, or a change in the structure of exports, the result of different income elasticities of demand for primary and manufactured products is slower growth in the primary-producing countries – perpetuating the development 'gap'. In the absence of protection, the only other alternative is deliberate depreciation of the currency. This has several disadvantages. For one thing the price elasticities of exports and imports may not be right for foreign exchange earnings to be increased, and second, depreciation will encourage production in existing activities, the concentration on which has contributed to the balance-of-payments difficulties in the first place.

There are certain equilibrating mechanisms in existence which may reverse the tendencies referred to, but they are likely to be weak and fairly slow in operating. First of all, it cannot be assumed that the industrial structure of the developing countries will remain unchanged. Over time it is natural that the proportion of total resources employed in the production of manufactured goods should increase, decreasing the rate of increase of imports of manufactured goods. Second, assuming that money income and population grow at the same rate in both sets of countries, if the terms of trade are deteriorating for the developing countries, then *real per capita* income cannot be growing so rapidly in developing countries. Thus even with a high income elasticity of demand for imports in developing countries, the absolute increments in imports may eventually equal exports through a terms of trade effect. Prebisch recognises this latter equilibrating mechanism, but rejects reliance upon it because of the sacrifice of real growth that it clearly involves.

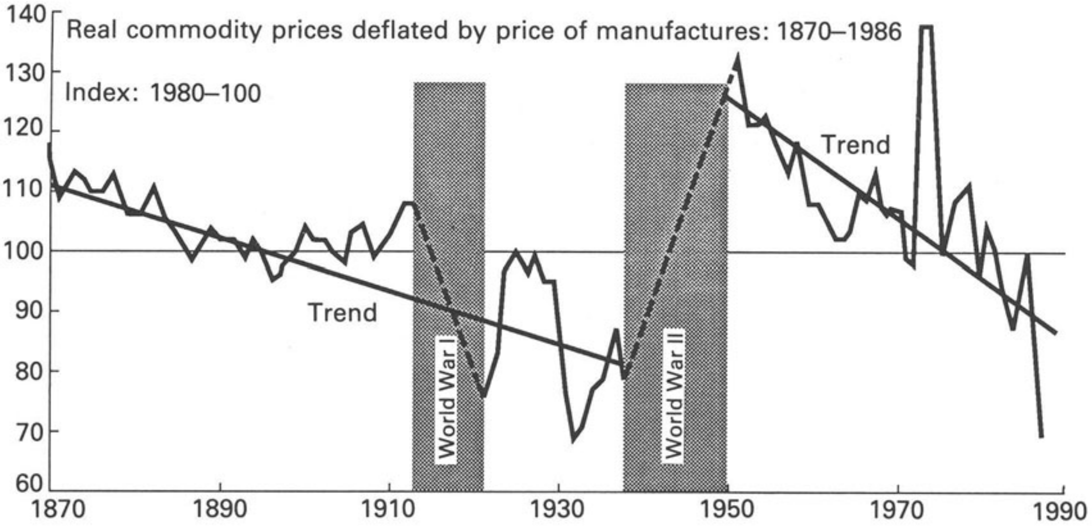
For balance-of-payments and terms-of-trade reasons (which are not unconnected), Prebisch therefore argues for the protection of certain domestically produced goods and the virtual establishment of monopolist export pricing by developing countries. Prebisch's balance-of-payments argument reinforces the classical infant-industry argument for protection to safeguard the terms of trade. Scitovsky (1942) showed long ago that in the two-country, two-commodity case a country can always gain by levying certain tariffs to improve its terms of trade which offset any losses from resource 'misallocation' as a result of the tariff – provided, of course, the other country does not retaliate. This is the notion of the 'optimum' tariff.

There are several benefits that Prebisch expects from protection. Protection would enable scarce foreign exchange to be rationed between different categories of imports, and could help to correct balance-of-payments disequilibrium resulting from a high income elasticity of demand for certain types of imports. Second, it could help to arrest the deterioration in the terms of trade by damping down the demand for imports; and third, it provides the opportunity to diversify exports and to start producing and exporting goods with a much higher income elasticity of demand in world markets. Following our earlier argument, however, protection by tariffs is only appropriate if the arguments for protection do not arise from domestic distortions.

Recent Trends in the Terms of Trade

Whether the terms of trade have moved unfavourably against primary commodities and the developing countries is an empirical question. Prebisch originally suggested an average deterioration of the terms of trade of primary commodities between 1876 and 1938 of 0.9 per cent per annum. Work by Hans Singer at the United Nations in 1949 also suggested a trend deterioration of 0.64 per cent per annum over the same period. The **Prebisch–Singer thesis** of the declining terms of trade for primary commodities was born (see Singer (1950)). In a detailed reappraisal of Prebisch's work, Spraos (1980) confirms the historical trend deterioration, but at the lower rate of approximately 0.5 per cent, having corrected the statistics for the changing quality of goods, shipping costs and so on. Extending the data to 1970, however, Spraos concluded that there is no significant trend deterioration. Sapsford ((1985) and (1988)), however, shows that it is the wartime structural break which makes the whole series look trend-

Figure 15.5 ***Movements in Net Barter Terms of Trade***



Source: South Magazine, October, 1987.

less. If the series is divided into two sub-periods – pre- and post-Second World War – there is a trend deterioration in both subperiods and the estimated trend deterioration over the whole period 1900–82 is 1.2 per cent per annum, allowing for the wartime structural break. The downward trend has continued (see **Figure 15.5**).

Grilli and Yang (1988) at the World Bank reach the same conclusion as Sapsford. Over the period 1900 to 1983, they put the percentage terms of trade deterioration of all primary commodities at 0.5 per cent per annum, and 0.6 per cent per annum for non-fuel commodities (allowing for the wartime structural break). For individual commodities, the trend deterioration is estimated as: food (−0.3 per cent p.a.); cereals (−0.6 per cent p.a.); non-food agricultural commodities (−0.8 per cent p.a.), and metals (−0.8 per cent p.a.). Only tropical beverages registered an improvement (0.6 per cent p.a.)

My own work with Bergevin (Thirlwall and Bergevin (1985)) concentrated on the post-war years, distinguishing between primary commodities exported by developing countries on the one hand and by developed countries on the other, estimating separately from 1960 to 1972 (before the oil shock) and 1973 to 1982 using quarterly data. For all primary commodities from developing countries, the annual trend deterioration was 0.5 per cent from 1960 to 1972 and 0.36 per cent from 1973 to 1982 (excluding oil). For primary commodities from developed countries, the trend was not significant.

The terms of trade of primary commodities relative to manufactures is not necessarily the same as the terms of trade of developing countries relative to industrial countries, because both sets of countries export and import both types of goods (albeit in different ratios), but in practice there is likely to be a close overlap and parallel movement between the two. Sarkar (1986) has looked at the export prices of developing countries relative to developed countries, and also at the prices of exports from developing to developed countries relative to prices of imports from developed countries to developing countries (both excluding fuel). In the first case, the trend deterioration was 0.51 per cent per annum; in the second case, the relative deterioration was 0.93 per cent per annum. Overall, there can be little doubt that over the last 30 years or so both the terms of trade of primary commodities, and the terms of trade of the developing countries as a whole, have deteriorated at roughly the average rate of the deterioration in the terms of trade of primary commodities since the turn of the century.

Sarkar and Singer (1991) have also looked at the terms of trade of *manufactures* exported by developing countries relative to developed countries over the period 1970–87, and find a deterioration of approximately 1 per cent per annum. It appears, therefore, that the developing countries suffer double jeopardy. Not only do the prices of their primary products decline relative to manufactured goods, but also the prices of these manufactured exports decline relative to those of developed countries, reflecting, no doubt, the commodity composition of their exports – their lower value-added and lower income elasticity of demand in world markets.

The terms of trade for each developing country between 1985 and 1990 is shown in **Table 15.1.** It can be seen from the table that there is a wide variety of experience between countries reflecting the diverse commodity composition of their exports and imports; but taking the low-income and middle-income countries together, the evidence shows a deterioration for the developing countries as a whole of 6 per cent. During the previous twenty years there had already been a 15 per cent deterioration in low-income countries. For the industrialised countries there was virtually no change – the rise in the price of manufactures being offset by the rise in the price of oil. A large part of the debt problem was the result of the collapse of commodity prices in the 1980s.

There is a distinction to be made between the **barter (or commodity) terms of trade** which measures the ratio of export to import prices, and the **income terms of trade**, which is the ratio of export to import prices times the quantity of exports (i.e. $(Px/Pm) \times Qx$). The income terms of trade is thus a measure of the total purchasing power of exports over imports.

From the point of view of development, measured by *per capita* income, the income terms of trade is perhaps the more relevant concept to consider than the barter terms of trade. It may well be, for instance, that the price of exports falls relative to imports owing to increased efficiency in the exporting country, and this releases resources for further exports which subsequently expand more than proportionately to the fall in price. The barter terms of trade would have worsened, but development would be stimulated. It is also worth remembering that when a country devalues its currency it deliberately worsens its barter terms of trade in the hope that the balance of payments will improve, providing scope for a faster growth of real income through a rapidly improved income terms of trade. On the other hand, if the demand for a country's exports is inelastic, then a decline in the barter terms of trade will also mean a deterioration in the income terms of trade.

In the long run, if world trade is buoyant, every country can experience an improvement in its income terms of trade. The question is not who are the gainers and who are the losers, as in the case of the barter terms of trade, but what are the relative rates of improvement in the income terms of trade? It is fairly clear that since the barter terms of trade has deteriorated for developing countries, and the rate of export growth has been slower in developing countries than in developed countries (see **Table 15.1**), the income terms of trade has also grown slower for the developing countries.

Trade Theory and Dual-Gap Analysis

Another dimension to the protectionist argument has been added by Linder (1967), drawing explicitly on dual-gap analysis. The crucial question, argues Linder, is whether a developing country's economic potential can be fully utilised at the same time as equilibrium is maintained externally. Free trade may not lead to the full employment of resources for two reasons: first, because of factor immobility; and second, because certain imports may be required to achieve full utilisation of resources and these import requirements may exceed exports. In our earlier discussion of dual-gap analysis in Chapter 14, we saw that if the import–export gap is dominant and foreign exchange is scarce, domestic resources may go unutilised in the absence of development policies to equate the import–export gap and the investment–savings gap *ex ante*. Potential domestic saving will fall either through a fall in the potential level of output or through a fall in the propensity to save through a redirection of expenditure. One solution, however, is to devote more domestic resources to import substitution or export promotion.

But Linder argues that in developing countries it may not be possible to solve the problem of the domestic underutilisation of resources through trade because of an export maximum. Classical trade theory, however, does not admit this. The notion of an export maximum is related to what Linder calls the **theory of 'representative demand'**, which determines the relative price structure for goods. The theory of representative demand states that the production function for a commodity will be the more advantageous in a country the more the demand for a commodity is typical of the economic structure of a country compared with other countries. The chief determinant of demand structure is *per capita* income, so that goods in demand in advanced countries have unfavourable production functions in developing countries and vice versa. The developing countries are therefore faced with severe marketing problems if they are to develop by trade. The goods they are best at producing are not demanded in developed countries, and they are very inefficient at producing the goods that are demanded in developed countries. Productivity may not be high enough to support resources in the production of these goods, and imported inputs for export production might absorb more foreign exchange than the exports eventually yield.

In Linder's view these circumstances provide a case for protection to save foreign exchange and to enable the full utilisation of domestic resources. This contrasts with conventional theory which does not allow for protection for balance-of-payments reasons or to increase the effective demand for domestic products to eliminate underemployment. Moreover, protection in this model involves no allocation losses because if foreign exchange is required to utilise domestic resources fully, the opportunity cost of resources is zero. The only qualification Linder makes to his argument for development based on import substitution and the expansion of domestic demand is if value-added is negative; that is, if imported inputs for domestic production involve a higher foreign exchange cost than the importation of the end-products themselves. Except in these circumstances, there is no conflict between allocation and capacity considerations or allocative efficiency and import substitution as long as a foreign exchange gap exists. Import substitution frees foreign exchange for imported inputs which allow the full utilisation of domestic resources.

■ Trade Policies

Prebisch and Linder both provide powerful critiques of neoclassical trade theory, but attack from different angles. While Linder argues the case for protection for the full utilisation of domestic resources, Prebisch argues the case for protection on the more 'orthodox' grounds of improving the terms of trade, and as a substitute for exchange depreciation to preserve simultaneous internal and external equilibrium. Moreover, while Linder argues explicitly for import substitution because of the existence of an export maximum, Prebisch seems to be more optimistic about growth through trade and against 'inward-looking' development policies. New export activities may, of course, require tariff protection or subsidisation in the early stages of their establishment, but there is a distinct difference between identifying lines of activity in which to promote exports and identifying lines of activity in which to develop import substitutes, and we must briefly examine these different strategies. In the former case, one is seeking out lines of comparative advantage; in the latter case, one is attempting to reverse the pattern of trade by altering comparative advantage.

If we accept the possibility of an import–export gap, because of a lack of substitutability in the short run between imports and domestic resources, Linder's argument for import substitution basically reduces to pessimism over the chances of promoting exports as an alternative means of fully utilising domestic resources. He admits that import-substitution activities will themselves require imports and presumably thinks, therefore, that, per unit of expansion of domestic output, import substitution would save more foreign exchange than could be earned by export promotion. The traditional case for export promotion is that it allows growth to proceed without foreign exchange difficulties and without suffering the allocative losses from violating comparative advantage.

What trade policy should be adopted by any particular country clearly depends on circumstances. Certainly not all developing countries fit the Linder model. Most developing countries do suffer from severe foreign exchange shortages, but one must be a little suspicious of the concept of the export maximum. It is true that the demand for developing countries' exports tends to lag behind that of the developed countries, but as our earlier figures in **Table 15.1** show, the export record of developing countries as a whole over the last two decades is not unrespectable. This, in some measure, is due to the greater diversification of exports than in the past, and there must be room for considerable improvement. The great danger of import-substitution policies is that by violating comparative advantage, increasing costs, and reducing competitiveness, they may impair the long-run efficiency and export-growth prospects of a country in the future.

The more lasting solution to balance-of-payments difficulties would seem to be the promotion of manufactured-goods exports, preferably with high price and income elasticities of demand, coupled with policies to substitute domestic resources for imports. If the prices of domestic and foreign resources reflected more accurately their opportunity costs, the import content of many activities might be reduced substantially. At the same time new areas of comparative advantage must be sought. If trade is not the engine of growth, it is probably a more desirable handmaiden than development by import substitution.

The policy recommendation of export-led growth leads on to the question of the trading relation between developed and developing countries. There are several ways in which the developed countries can contribute to a solution of the balance-of-payments problems of developing countries, especially by helping export earnings. The means of help fall into two main categories which we shall consider in turn: first, the granting of trade preferences; and second, international commodity agreements to stabilise or increase earnings from exports.

■ Trade Preferences

The main pressure group for trade preferences for developing countries' exports is the UN Conference on Trade and Development (UNCTAD), which was first convened in Geneva in 1964. It was in this year that the Conference was converted into a permanent organisation consisting of 132 member countries, with a fifty-five-member Directing Board and a permanent Secretariat under Prebisch (who previously headed the UN Commission for Latin America) as Secretary-General. There have been seven further meetings of UNCTAD, the latest being in Colombia in 1992. Apart from these periodic meetings, the organisation exists as a continuous pressure group with the aim of assisting developing countries through trade and aid – primarily trade. Included among its objectives are: greater access to the markets of the developed countries through the reduction of trade restrictions; more stable commodity prices; assistance from the developed countries equivalent to 1 per cent of their national income; and compensation for developing countries whose foreign exchange earnings fall below 'expectations' owing to deterioration in their terms of trade. Its main platform, however, is for a system of tariff preferences for the developing countries' exports of manufactured and semi-manufactured goods on the lines of the Commonwealth preference agreement, or in the form of quotas of duty-free imports. In this respect, there is an important difference between UNCTAD and other bodies merely concerned with non-discriminatory reductions in barriers to world trade, e.g. the General Agreement on Tariffs and Trade (GATT).

Following the 1964 UNCTAD Conference, the establishment of a preferential system of tariff rates was negotiated whereby industrial nations would lower duties on imports from developing countries while continuing import duties at the same level on goods from other countries. On paper the agreement looked attractive. In practice, however, the scheme only covered 23 per cent of the value of export flows from developing countries, one-half of which went to the United States, which did not implement the scheme. Other countries excluded some commodities for protectionist reasons. According to calculations by Murray (1973), only about one billion dollars' worth of trade was covered, or 5 per cent of total trade. The scheme also embodied restrictive ceilings (quotas) so that the preferential tariff advantages disappeared for marginal trade. Over all, the benefits of the scheme have gone mainly to the ten or so more advanced developing countries who export products covered by the scheme, and not to the smaller, poorer developing nations.

Perhaps the most significant trade agreement negotiated to date to help poorer developing nations is that signed at the **Lomé Convention** 1975 between the European Economic Community and forty-six developing countries, mainly in Africa, which provided for free access to the European market for all the developing countries' manufactured goods and also for 90 per cent of their agricultural exports. In addition agreement was reached to stabilise the foreign exchange earnings of twelve key commodities: cocoa, groundnuts, coffee, cotton, coconuts, palm, hides and skins, wood, bananas, tea, sisal and iron ore (the so-called **Stabex scheme**). The producers of these commodities are guaranteed a certain level of earnings, provided the commodity concerned represents a certain minimum proportion of total export earnings of the producer country. If so, it may request a transfer from the EEC when export earnings fall by more than 7.5 per cent below a four-year moving average. The Lomé Convention also disperses aid to the African, Caribbean and Pacific (ACP) countries through the European Development Fund. Since 1975 the Convention has been renegotiated three times.

■ Effective Protection

In arguing for lower tariffs and tariff preferences, a distinction needs to be made between nominal protection and effective rates of protection. It is now widely recognised, in theory and in practice, that nominal tariffs on commodities are not the appropriate basis for assessing the restrictive effect of a tariff structure on trade.[1]

The nominal rate does not measure how inefficient (or costly) a producer can be without incurring competition and losing his market. This is measured by the protection of **value added,** which is the difference between the value of output and the value of inputs. The protection of value added is the so-called **effective rate of protection.** Since value added is the difference between the value of output and inputs, not only is the tariff on output important in measuring the degree of protection, but also the tariff on inputs.

Formally, the effective rate of protection is measured as the excess of domestic value added over value-added at world prices expressed as a percentage of the latter. Thus the effective rate of protection of industry X may be defined as:

$$EP_x = \frac{V'_x - V_x}{V_x} = \frac{V'_x}{V_x} - 1$$

where V'_x is domestic value added under protection and V_x is value added under free-market conditions (at world prices). Domestic value added is equal to the sales of the industry's product minus the sum of intermediate inputs, all valued at domestic market prices, i.e. including the effect of tariffs on the finished good and on the inputs into the finished good. The free-market value added can be defined identically, but with the final product and input prices measured exclusive of tariffs on them. It is clear that the height of the effective tariff rate depends on three variables: (i) the level of nominal tariffs on output, (ii) the proportion of value added to total output, and (iii) the level of nominal tariffs on the industry's inputs. The higher the nominal tariff, the lower the tariff on imported inputs, and the higher the proportion of value added to total output, the higher the effective rate of protection. If the tariff on finished goods is very high and the tariff on inputs is low, domestic value added can be very high; world value added in turn can be very low, giving enormous rates of effective protection, sometimes in excess of 1000 per cent.

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[1] For one of the original theoretical expositions, see Corden (1966).

Let us now give a practical example. Suppose Indian textiles have a world price of \$5, of which \$3 represents raw-material costs and \$2 represents value added. Now let us suppose that imports of Indian textiles into a developed country are subject to a tariff of 20 per cent while domestic producers must pay a tariff of 10 per cent on textile raw materials. To remain competitive, the domestic producer must produce the commodity for not more than \$6. The value added can be \$6 minus the cost of raw materials plus the tariff on raw materials, i.e. \$6 − (\$3 + \$0.30) = \$2.70. The effective rate of protection is the difference between the domestic value added and Indian value added (i.e. value added at world prices) expressed as a percentage of Indian value added, i.e. (2.70 − 2)/2 = 35 per cent. This is the effective rate of protection equal to the difference between the gross subsidy on value added provided by the tariff on the final product (\$(1/2) = 50 per cent) and the implicit tax on value added as a result of the tariff on raw materials (\$(0.30/2) = 15 per cent). This is the extent (35 per cent) to which production can be more costly in the developed country without losing competitive advantage, or, to put it another way, it is the degree to which Indian textile producers would have to be more productive to compete in the developed country market.

Effective rates of protection almost always exceed nominal rates. At one extreme if a country gets raw material inputs duty free (at world prices) but puts a tariff on the final good, the effective rate must be higher than the nominal rate. At the other extreme, if a country puts a tariff on inputs but no tariff on the finished good, the effective rate of protection is negative.[1]

The calculations of the effective rate of protection also depend on what exchange rate is employed. If the exchange rate of a country in the protected situation is overvalued, the price of imported inputs measured in domestic currency will be undervalued and this will affect the calculation of the domestic value added and the value added at world market prices. Without adjustment for this factor, effective rates of protection are described as 'gross'; with adjustment they are referred to as 'net'.

Our example of the effective rate of protection also assumed that all inputs are traded. Some inputs will be non-traded, however, and their price enters into both the value of total output and total inputs. If the effect of protection on the price of non-traded goods is ignored, the rates of effective protection will be overestimated. It is not in practice easy to estimate the effect of protection on the price of non-traded goods.

The theory of effective protection suggests that the same *nominal* tariff cuts mean different degrees of change in effective rates of protection, and it may thus be unwise for the developing countries to press for across-the-board tariff cuts on all commodities. Reductions in tariffs against their primary products will increase the effective rate of protection against their manufactures, which, we have argued, are more important exports as far as long-run development prospects are concerned. The average nominal level of protection in developed countries is about 12 per cent, but effective protection against the goods of developing countries may well be in the region of 30 per cent or more. Developing countries themselves may give their own producers very high rates of effective protection. Little, Scitovsky and Scott (1970) quote average rates on manufactured goods of 162 per cent in Argentina, 116 per cent in Brazil, 271 per cent in Pakistan and 313 per cent in India.[2]

The argument for reductions in tariffs against the final manufactured goods of developing countries is unexceptional, but is it doubtful whether there is much scope for preferences to contribute substantially to an increase in export earnings. Export prices would have to be less than the domestic price in the preference-giving country and must not exceed the competitor's price by more than the amount of the preference. On the assumption that the tariff rate on manufactured goods in the advanced industrial countries is between 10 and 15 per cent, and that the advanced countries were willing to give 50 per cent preference, this would mean a preference margin of only 5–8 per cent. Industries in which a preference margin of 5–8 per cent would enable developing countries to take markets away from domestic producers and developed country competitors are likely to be few and far between.

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[1] Students might like to prove these propositions for themselves using the formula for the effective rate of protection.

[2] See also the pioneer work of Lewis and Guisinger (1968) and the work of Balassa *et al.* (1971).

But it is not only tariffs that restrict trade. There are many non-tariff barriers to trade in manufactures between developed and developing countries, the removal of which might contribute more to increasing export earnings than a simple reduction in tariff barriers, e.g. licensing requirements, quotas, foreign exchange restrictions, procurement policies favouring domestic products, anti-dumping regulations, subsidies to exports in developed countries, and so on.

Trade Between Developing Countries

Trade between developed and developing countries is likely to involve the developing countries in continual deficit. Moreover, it is difficult for the developing countries to penetrate the developed countries' markets for manufactured goods when the cost of producing manufactured goods is frequently much higher than in the developed countries. A possible simultaneous solution to the achievement of a higher utilisation of manufacturing capacity and the avoidance of payments problems with developed countries is for the developing countries to issue their own international money, on lines originally suggested by the Stewarts (1972), which would increase the purchasing power of each developing country and encourage trade between the developing countries themselves. The Stewarts suggest that the developing countries as a group should issue their own international money, *rocnabs* (*bancor* backwards, which was the name for the new international money suggested by Keynes at Bretton Woods in 1944), which they would agree to accept in part payment for goods sold to each other. This would have the effect of increasing the purchasing power of every developing country over the goods and services of every other country in the group. Exports would expand, but the reserve position of the importing country would be unimpaired. In effect *rocnabs* would work like Special Drawing Rights work on a world scale (see Chapter 16). Because countries would accept *rocnabs* in part payment for exports there would be an incentive for countries with foreign exchange difficulties to switch imports from developed countries to other developing countries because imports would cost less in convertible currencies. Exports to other developing countries would be encouraged where countries could not sell all they could produce in hard-currency markets. One problem that might arise is some countries accumulating *rocnabs* which they had no use for, while other countries in persistent deficit run short. To make the scheme workable it might be necessary to get each country into trading balance with all other countries taken as a group (although not with any one country). Alternatively, accumulated *rocnabs* could be sold back at a discount to deficit countries and used again. The main advantage of the scheme is that it requires little cooperation for it to be workable once the initial decision to issue and accept *rocnabs* has been taken, and it does not require action by the developed countries, which is so often a major stumbling block to the implementation of measures to improve the economic condition of the developing countries.

International Commodity Agreements[1]

The developing countries in particular, and the world economy in general, suffer several problems from the uncontrolled movements of primary commodity prices. First there is the fact already mentioned of the gradual trend deterioration in the prices of primary commodities relative to industrial goods, which reduces the real income and welfare of the developing countries directly. Secondly, primary product prices are much more cyclically volatile than industrial goods' prices. Since 1960, for every 1 per cent change (up and down) in the prices of industrial goods, primary product prices have fluctuated by 2.4 per cent (see Thirlwall and Bergevin (1985)). Disaggregation by commodity group shows a cyclical elasticity of 1.25 for food; 1.3 for agricultural non-food products, and 2.9 for minerals (including petroleum). This volatility has a number of detrimental consequences. First it leads to a great deal of instability in the foreign exchange earnings and balance of payments position of developing countries which makes investment planning and economic management much more difficult than otherwise would be the case. Secondly, because of asymmetries in the economic system, volatility imparts inflationary bias combined with tendencies to depression in the world economy at large. When primary product prices fall, the demand for industrial goods falls but their prices are sticky downwards. When primary product prices rise, industrial goods' prices are quick to follow suit and governments depress demand to control inflation. The result is stagflation. Thirdly, the volatility of primary product prices leads to volatility in the terms of trade which may not reflect movements in the equilibrium terms of trade between primary products and industrial goods in the sense that supply and demand are equated in both markets. In these circumstances world economic growth becomes either supply constrained if primary product prices are 'too high' or demand constrained if primary product prices are 'too low' (see Chapter 3, p. 101) (Thirlwall (1986)). On all these macroeconomic grounds there is a *prima facie* case for attempting to introduce a greater degree of stability into markets for primary commodities (including, I believe, oil).

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[1] For an up-to-date discussion of the issues involved in this section, see Maizels (ed.) (1987).

The issue of primary product price instability is not something new. It preoccupied Keynes both before and during the Second World War. In a memorandum in 1942 on the 'International Regulation of Primary Commodities' he remarked: 'one of the greatest evils in international trade before the war was the wide and rapid fluctuations in the world price of primary commodities . . . It must be the primary purpose of control to prevent these wide fluctuations' (Moggridge 1980).) Keynes followed up his observations and proposals with a more detailed plan for what he called **'commod control'** – an international body representing leading producers and consumers that would stand ready to buy 'commods' (Keynes's name for typical commodities), and store them, at a price (say) 10 per cent below the fixed basic price and sell them at 10 per cent above (Moggridge (1980)). The basic price would have to be adjusted according to whether there was a gradual run-down or build-up of stocks, indicating that the price is either 'too low' or 'too high'. If production did not adjust (at least downwards), Keynes recognised that production quotas might have to be implemented. Commodities should be stored as widely as possible across producing and consuming centres. This proposal is of some contemporary relevance as a means of responding quickly to conditions of famine. There could be a system of granaries strategically placed across the world under international supervision which could store surpluses and release them at time of need. The finance for the storage and holding of 'commods' in Keynes's scheme would have been provided through his proposal for an International Clearing Union, acting like a world Central Bank, with which 'commod controls' would keep accounts.

At the present time, finance for storage and holding could be provided through the issue of Special Drawing Rights (SDRs) by the IMF (see Chapter 16, p. 407). A scheme, such as 'commod control' could make a major contribution to curing the international trade cycle with all its attendant implications. Over fifty years on from Keynes's wartime proposal, primary product price fluctuations still plague the world economy. The world still lacks the requisite international mechanisms to rectify what is a major source of instability for the world economy. From 1980 to

1991, primary product prices fell on average by 40 per cent, and this has been a major cause of the international debt crisis which still lingers.

In the recent past there have been five main international commodity agreements in operation accounting for some 35 per cent of non-oil exports of the developing countries, but all have had their difficulties in achieving price objectives. The agreements which have operated with spasmodic success are the International Sugar Agreement (1977), the Sixth International Tin Agreement (1981), the International Natural Rubber Agreement (1979), the International Cocoa Agreement (1980), and the International Coffee Agreement (1963).[1] Only the Rubber and Coffee agreements still function. The basic problem with all agreements is getting suppliers to abide by quotas to restrict output in the face of declining prices. Participants must share a common purpose. The most successful 'commodity agreement' of all in the world economy is the Common Agricultural Policy of the EEC.

Small fluctuations in the export earnings of developing countries, arising from falling prices, are capable of offsetting the whole of the value of foreign assistance to developing countries in any one year. Approximately a 10 per cent fall in export earnings would be equivalent to the annual flow of official development assistance in 1991. Stability of export earnings, it would appear, is at least as important as foreign assistance.[2] In general, the instability of export proceeds is the joint product of variations in price and quantity. Large fluctuations in earnings may be causally related to four factors: (i) excessive variability of supply and demand; (ii) the low price elasticity of supply and demand; (iii) excessive specialisation on one or two commodities; (iv) the concentration of exports in particular markets. An early study by Macbean (1966) examined these causal factors for a selection of developing countries. He found variations in supply as the major determinant of the instability of export earnings. If the source of instability does come from the side of supply, stabilising prices will not, of course, stabilise earnings. It will positively impair them in times of scarcity and boost them in periods of glut. If there is a tendency towards perpetual over-supply, and demand is price inelastic, price stabilisation will maintain earnings, but price stabilisation will further encourage supply, which may then necessitate production quotas and lead to inefficiency in production if producing countries are allocated quotas to satisfy equity rather than efficiency. This is not to argue that there is not a case for compensation, but that methods should be avoided which encourage overproduction or inefficiency. It may be better to let prices find their market level and for the producing countries to be compensated by the beneficiaries under long-term agreements, with the compensation used to encourage some producers into other activities. Alternatively, income-compensation schemes could be worked out, especially in cases where export instability resulted from variations in domestic supply. In practice, several alternative methods of price stabilisation have been tried or recommended, including buffer stock schemes, export restriction schemes, and price compensation schemes and we must briefly examine these.

■ Buffer Stock Schemes

Buffer stock schemes operate by buying up the stock of a commodity when its price is abnormally low and selling the commodity when its price is unusually high. The success of such schemes rests on the foresight of those who manage them. Purchases must be made when prices are low relative to future prices and sold when prices are high relative to future prices. Clearly, buffer stock schemes are only suitable for evening out price fluctuations. They cannot cope with persistent downward trends in price without accumulating large stocks of the commodity which must be paid for – and presumably sold in the future at still lower prices. In 1986 the buffer stock for tin ran into severe financial difficulties by trying to maintain the price of tin 'too high' for 'too long'. Storage schemes are also only appropriate for goods that can easily be stored, and for which the cost of storage is not excessive.

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[1] For a comprehensive discussion of international commodity agreements and commodity problem in general see Maizels (1992).

[2] For a good summary of the measures of instability and the empirical evidence of the effects of instability on the economies of developing countries, see Stein (1977).

■ Restriction Schemes

In contrast to buffer stock schemes, which are concerned with stabilising prices, restriction schemes are more concerned with maintaining the purchasing power of commodity prices in relation to industrial goods; that is, in preventing a deterioration in the terms of trade of primary commodities. The essence of a restriction scheme is that major producers or nations (on behalf of producers) get together and agree to restrict the production and export of a good whose price is falling, thus maintaining or increasing (if demand is inelastic) revenue from a smaller volume of output. In practice, it is very difficult to maintain and supervise a scheme of this nature, largely because it becomes extremely attractive for any one producer or nation to break away from, or refuse to join, the scheme. This is something Prebisch overlooks in his recommendation for monopoly exporting pricing. It is convenient to conduct theoretical analysis in terms of two countries and two commodities, but when it comes to practical policies the reality of the existence of many countries must be contended with. The disadvantages of restriction schemes are, first, that it is by no means certain that demand is not elastic in the long run, so that raising price by restricting supply may reduce export earnings in the long run. Restriction schemes may ultimately lead to substitution for the product, and falling sales. Second, restriction schemes can lead to substantial resource allocation inefficiencies stemming from the arbitrary allocation of export quotas between countries, and production quotas between producers within countries, unless the quotas are revised regularly to take account of changes in the efficiency of production between producers and between regions of the world. There is also a danger with any form of price-support scheme of a multilateral nature, where both developed and developing countries produce the good in question, that 'assistance' does not all go where it is most needed. In this event there is a stronger case for bilateral arrangements over commodities between developed and developing countries, rather than schemes which embrace developed countries which subsequently reap the benefit.

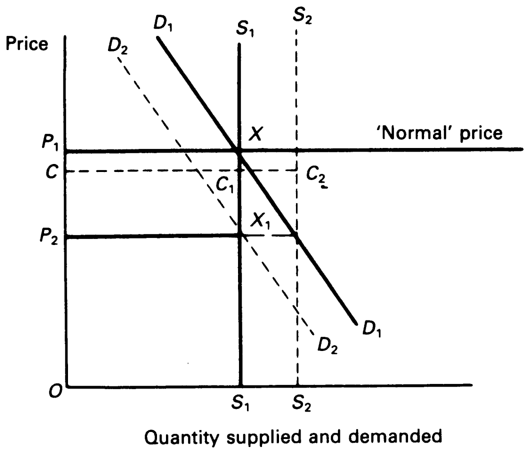
■ Price Compensation Agreements

Price compensation agreements lend themselves to this form of bilateral arrangement. For example, if the price of a commodity falls, two countries could agree upon a sliding scale of compensation such that the importing country pays an increasing sum of money to the exporter as the price falls below a 'normal' price specified in advance. The sliding scale of compensation could be applied to the deviations of the actual price from the 'normal' price. Since restrictions on output and quotas are no part of the scheme, arrangements of this kind have the beauty of divorcing the efficiency aspects of pricing and commodity arrangements from the distributional aspects. The commodity would be traded at world prices, and the lack of full compensation would ensure that if world prices were falling some countries would decide to shift resources so maintaining some degree of allocative efficiency.

Agreements need not only be bilateral. It would also be possible to draw up multilateral price compensation agreements, with the governments of all exporting and importing countries of a commodity agreeing jointly on a standard price, and on a 'normal' quantity of imports and exports of the commodity for each country concerned. There could also be a common sliding scale of compensation. For reasons mentioned earlier, however, there is perhaps a greater case for bilateral deals so that assistance can be given where it is most needed and where countries are not bound by the conventions of an international agreement.

There is no reason why price compensation schemes should not run concurrently with other types of international commodity agreements. Indeed, if there is a continually declining price of a

Figure 15.6



commodity, it may be necessary to couple a restriction scheme with a price compensation scheme, otherwise importing countries will be *persistently* subsidising the exporting countries, which may not be welcomed. There is also the danger in this case, and also in the case of price-support schemes, that one form of assistance will replace another. If developed countries continually have to pay higher than market prices for their primary products, and argue at the same time that the major constraint on financial assistance to developing countries is their balance of payments, they may use price compensation agreements as an excuse for cutting other forms of assistance. If so, what primary producers gain in the form of higher price or higher export earnings than if the market was free, they lose in other ways.

If fluctuations in price emanate from the supply side, and not from changes in demand, price compensation will operate perversely on the stabilisation of export earnings. This is illustrated in **Figure 15.6**. Price in the market is determined by the intersection of the supply and demand curves, D_1D_1 and S_1S_1, giving equilibrium price, P_1. Now suppose that there is a decrease in demand to D_2D_2, causing price to fall to P_2. Earnings before the price fall were OP_1XS_1; after the price fall, $OP_2X_1S_1$. Assume P_1 to be the 'normal' price agreed under the price compensation scheme, and that P_2C represents the appropriate amount of price compensation in relation to the deviation from 'normal' price following the decrease in demand. Total revenue under the price compensation scheme will be OCC_1S_1, which is not far short of total revenue before the price fall. Consider, however, an equivalent fall in price from P_1 to P_2 as a result of an increase in supply from S_1S_1 to S_2S_2. Under the same price compensation scheme total revenue is now $OCC_2\,S_2$, which is greatly in excess of the original total revenue, before the price fall, of OP_1XS_1. Conversely, if the supply falls, and the price rises above the 'normal' price, revenue will be less than before the price rise since the exporting country would presumably be compensating the importing country – unless the scheme works only one way!

■ Income Compensation Schemes

The only way to overcome the induced instability of price compensation schemes is to formulate income compensation schemes which take account of both price and quantity changes. The practical difficulty is reaching agreement on a 'normal' level of income. With the trend rate of growth of output positive for most commodities, to settle for a fixed level of 'normal' income would be unjust. Each year's compensation could perhaps be based on deviations of actual export earnings from the moving average of a series of previous years. The IMF have a scheme in existence of the income-stabilisation type, which operates on these lines, called the Compensatory Finance Facility, which we discuss in the next chapter. The Stabex scheme operated by the EEC is another example.

■ Producer Cartels

Impatience with the international community in the developing countries in formulating schemes to protect their balance of payments and terms of trade has led in recent years to the effective cartelisation of the production of certain raw materials by the developing countries themselves, especially where the number of producers is small and close relations are enjoyed by the producers in other respects. The feeling of the developing countries was well articulated at a meeting in Dakar in 1975 of over 100 developing countries where it was declared that the recovery and control of natural resources held the key to their economic freedom, and countries were urged to draw up a joint plan to protect the prices of their exported commodities. The classic example of cartelisation in recent years has been the action of the oil-producing countries of the Organisation for Petroleum Exporting Countries (OPEC) in raising the price of crude oil by 800 per cent since December 1973. The producers of bauxite have similarly joined together to raise prices. This trend may be expected to continue.

Developing countries are not only producers of raw materials, however; they are also consumers, and what some countries gain with respect to the production and export of one commodity they may lose with respect to the import and consumption of another. Some developing countries, poor in all raw material production, may not benefit at all. It is not clear, except in the case of a few special commodities like oil, that cartelisation and monopoly pricing of the product will necessarily redistribute income from the developed to the developing countries taken as a whole. If this is so, bilateral commodity agreements between poor-country producers and rich-country users are probably preferable as a means of ensuring that all developing countries benefit from the general desire in the world economy to help poor, primary-producing countries.

■ Trade *vs* Aid

'Trade not aid' has become a popular aphorism in developing countries in recent years. Let us now consider whether a unit of foreign exchange from exports is really worth more than a unit of foreign exchange from international assistance, or whether the slogan is more an understandable reaction to the debt-servicing problems arising from *past* borrowing (the benefits of which may have been forgotten) and to the political interference and leverage that may accompany international assistance.

If the meaning of aid is taken literally (i.e. as a free transfer of resources), Johnson (1967) has shown than a unit of foreign exchange from exports can never be as valuable as a unit of foreign exchange from aid. The reason is that exports do not provide additional resources for investment directly, only indirectly by the opportunity provided to transform domestic resources into goods and services more cheaply than if the transformation had to be done domestically. Aid, on the other hand, both provides resources directly, and also indirectly by saving the excess cost of import substitution. The relative worth of exports compared to pure aid can therefore be expressed as:

$$\frac{cX}{(1 + c)A} \qquad (15.1)$$

where X is the value of exports, A is the value of pure aid, and c is the proportional excess cost of import substitution. The relative worth of exports will rise with the excess cost of import substitution, but it is clear that the worth of exports can never match the worth of an *equal* amount of pure aid ($X = A$) since $c < (1 + c)$. The fact that aid may be tied to higher-priced goods makes some difference to the argument but it can be shown that the excess cost of import substitution and the excess cost of tied goods would have to be relatively high for the worth of aid not to exceed the worth of trade. Let r be the ratio of the price of tied goods to the price of the same goods in the free market. The relative worth of exports may then be written as:

$$\frac{cX}{(1 + c)A} \times r \qquad (15.2)$$

Now exports will be worth more than aid if $cr > (1 + c)$. Different combinations of c and r could be thought of which satisfy this condition but both c and r would have to be quite high, e.g. $c = 2.0$ and $r = 1.5$.

The more important consideration, however, is that the term 'aid' in the slogan 'trade, not aid' should probably not be interpreted literally. The comparison that developing countries are making is not between trade and pure aid but either between trade and the **aid component** of an equal amount of foreign assistance, or simply between trade and an equal amount of foreign assistance. If these are the comparisons being made in practice, two interesting questions arise. First, under what circumstances will trade be more valuable? And second, which is the most appropriate comparison to make?

Consider first the comparison between exports and the aid component of an equal amount of foreign assistance. If this is the comparison that is being made by the developing countries, the Johnson formula can be modified by letting $A = Fg$, where A is the aid component of assistance (see p. 343), F is the nominal amount of foreign assistance, and g is the aid component as a proportion of nominal assistance (i.e. the grant element). Substituting Fg for A in equation (15.1) gives the relative worth of exports compared to the aid component of an equal amount of foreign assistance as:

$$\frac{cX}{(1 + c)Fg} \tag{15.3}$$

or, if the aid is tied:

$$\frac{cX}{(1 + c)Fg} \times r \tag{15.4}$$

From (15.3) the value of exports will exceed the value of the aid component of an *equal* amount of foreign assistance ($X = F$) if $c > g(1 + c)$, and, from (15.4), if $cr > g(1 + c)$. The relative worth of exports is greater, the higher the excess cost of import substitution, the higher the excess cost of tied aid and the lower the grant element of assistance. It is still the case, however, that c and r would have to be quite high and g relatively low for the worth of exports to exceed the worth of the aid component of an equal amount of foreign assistance.

But even if a comparison of exports with the aid component of an equal amount of foreign assistance showed exports to be worth more, however, it is not clear that this is the correct comparison to make justifying the slogan 'trade, not aid'. Equations (15.3) and (15.4) assume that only the aid component of assistance saves the excess cost of import substitution. In fact, foreign borrowing *on any terms* saves the excess cost of import substitution. This being so, there are strong grounds for arguing that the comparison which should underly the slogan 'trade not aid' is a comparison of the worth of exports with the worth of foreign assistance itself of equal amount, which provides resources directly equal to Fg and indirectly equal to Fc. The relative worth of exports compared to foreign assistance can thus be expressed as:

$$\frac{cX}{Fg + Fc} = \frac{cX}{(g + c)F} \tag{15.5}$$

or, with tied assistance:

$$\frac{cX}{(g + c)F} \times r \tag{15.6}$$

The conditions for the worth of exports to exceed that of foreign assistance are clearly more stringent than for the worth of exports to exceed the worth of the aid component of an equal amount of foreign assistance. Now, ignoring the potential excess cost of tying, foreign assistance is always worth more than an equal value of exports as long as there is some grant element attached to the assistance (i.e. as long as $g > 0$).

The values of g, c and r give a practical guide to any country of the relevance of the slogan 'trade, not aid', ignoring the secondary repercussions and the side-effects of the two resource flows.[1] The values of g, c and r for most developing countries are probably not such as to justify the slogan 'trade, not aid' on narrow economic grounds. As far as secondary repercussions are concerned, however, there is the question of the productivity of resources from abroad compared with those released by exports, and of the additional saving generated by the two means of resource augmentation. There is little evidence on the first point, but on the second it is sometimes claimed, as we saw in Chapter 14, that foreign assistance discourages saving, while export earnings contribute positively to saving. There need be no dispute that some foreign assistance may be 'consumed' but this is not the important consideration. The question is, which resource flow leads to the most investment? If 50 per cent of the foreign assistance is 'saved' and the propensity to save of the export sector is 50 per cent, the contribution of the two sources of foreign exchange to growth is exactly the same. There is no evidence to suggest that the propensity to 'save' out of foreign assistance is less than the propensity to 'save' out of exports. From the studies of Maizels and Lee reported earlier, the propensity to save out of exports would appear to be of the order of 0.6. On this basis, 40 per cent of foreign assistance would have to be 'consumed' for foreign assistance not to contribute as much to saving as exports. If anything, therefore, the economic secondary repercussions of exports and assistance favour assistance.

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[1] For some illustrative calculations see Thirlwall (1976).

Questions for Discussion and Review

1. What is the essence of the distinction between the static and dynamic gains from trade?
2. What are the fundamental assumptions of free trade theory that may be violated in the context of developing countries?
3. Why is there an historic tendency for the terms of trade to move against primary producing countries?
4. Outline the various arguments for protection.
5. Under what conditions are tariffs a first-best policy of protection?
6. Discuss the relative merits of import substitution versus export promotion.
7. Why do some economists argue that the gains from trade should be looked at more from the point of view of the effect of trade on the balance of payments than from the traditional viewpoint of real resource augmentation?
8. What do you understand by the concept of 'effective protection', and how is it measured?
9. What problems does the instability of commodity prices pose for a country and for the world economy?
10. What information would you require to evaluate whether a unit of foreign exchange from trade was more or less valuable than a unit of foreign exchange from international assistance?

■ Chapter 16 ■

The Balance of Payments, International Monetary Assistance and Development

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Balance-of-Payments Constrained Growth

We have seen how the composition of the trade of developing countries can lead to severe balance-of-payments difficulties, which can act as a constraint on growth, and how vulnerable many developing countries are to exogenous shocks which affect adversely both their export earnings and import payments. In this chapter we shall define formally the concept of a **balance-of-payments constrained growth rate** and examine its determinants. We shall then go on to consider the measures that countries themselves may take to raise the balance-of-payments constrained growth rate, and the assistance provided by international institutions to ease the constraint. The latter involves mainly a consideration of the role of the International Monetary Fund in the provision of balance-of-payments support.

Table 16.1 shows the recent balance-of-payments experience of the developing countries as a whole and by continent. The poor countries have always been in deficit, but the deficits fluctuate according to internal and external economic circumstances. In the 1970s, for example, owing to the oil shock in 1973 (and later 1979), and the slowdown of world growth, the deficits grew considerably despite a slowdown of growth internally which reduced the demand for non-oil imports. In the early 1980s, the deficits contracted because most developing countries

Table 16.1 ***Summary of Payments Balances on Current Account (in billions of U.S. dollars)***

	1984	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*	*1991*
Developing countries excluding Eastern Europe and former USSR	**−31.7**	**−24.9**	**−46.4**	**−3.9**	**−22.4**	**−18.4**	**−7.9**	**−84.8**
All developing countries	**−19.7**	**−18.2**	**−36.6**	**10.5**	**−13.7**	**−22.9**	**30.3**	**−94.0**
By region								
Africa	−7.8	−1.2	−10.7	−5.2	−10.4	−7.1	−2.2	−5.8
Asia	−3.5	−13.1	4.7	22.1	10.5	1.2	−1.0	−13.1
Europe	10.4	5.5	8.3	13.7	10.3	−3.6	−25.0	−10.0
Middle East	−17.8	−7.6	−22.5	−11.1	−14.8	−7.2	2.1	−45.7
Western Hemisphere	−0.9	−1.9	−16.4	−9.1	−9.2	−6.1	−4.2	−19.4
Eastern Europe and former USSR	12.0	6.7	9.8	14.4	8.7	−4.4	−22.4	−9.2

Source: IMF, *World Economic Survey*, 1992.

were forced to adjust (i.e. deflate) in order to repay debt out of diminished export earnings. Since the mid-1980s the deficits have increased again with some internal recovery and a greater willingness of the international capital markets to resume lending. The deficit in 1991 stood at $94 billion, financed by capital inflows of various types. Any measured (*ex post*) deficit measures the extent to which the country concerned has been able and willing to finance the difference between the value of current payments and receipts.

Every country will have a growth rate consistent with balance-of-payments equilibrium on current account, and with its overall balance on current and capital account. What determines the growth rate consistent with current account balance on the one hand, and overall balance on the other? If we specify the equilibrium equations, and the determinants of import and export demand, we can immediately see the major factors of importance, and we can appreciate in turn the various policy measures taken by individual countries and the international community to raise the growth rate of less developed countries consistent with balance-of-payments equilibrium.[1]

The current account balance-of-payments of a country, measured in its own *domestic* currency, may be written as:

$$P_dX = P_fME \qquad (16.1)$$

X measures the quantity of exports and P_d is the average price of exports, so that P_dX is the value of exports in domestic currency. M is the quantity of imports; P_f is the average (foreign) price of imports, and E is the nominal exchange rate measured as the domestic price of foreign currency which thus converts the value of imports measured in foreign currency (P_fM) into a domestic currency equivalent.

The condition for the balance-of-payments to remain in equilibrium in a growing economy through time is that the *rate* of growth of export earnings should equal the *rate* of growth of import payments, i.e.

$$(p_d + x) = (p_f + m + e) \qquad (16.2)$$

where the lower-case letters represent rates of change of the variables.

Now let us consider what the growth of export and import volume depends on. Export demand may be expected to depend primarily on the price of a country's exports relative to the foreign price of similar goods (expressed in a common currency) and on the level of 'world' income which determines the purchasing power over a country's goods. Similarly, import demand may be expected to depend on the price of imports relative to domestic substitutes and on the level of domestic income. If the price and income elasticities of demand for exports and imports are assumed to be constant, we may write the export and import functions in the following (multiplicative) way:

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[1] For the original development of this model, see Thirlwall (1979).

$$X = \left(\frac{P_d}{P_f E}\right)^{\eta} Z^{\epsilon} \tag{16.3}$$

and $$M = \left(\frac{P_f E}{P_d}\right)^{\psi} Y^{\pi} \tag{16.4}$$

where Z measures 'world' income; Y measures domestic income; η is the price elasticity of demand for exports (< 0); ϵ is the income elasticity of demand for exports (> 0); ψ is the price elasticity of demand for imports (< 0), and π is the income elasticity of demand for imports (> 0).

Taking small rates of change of the variables in equations (16.3) and (16.4) we can see what the growth of exports and imports depends on:

$$x = \eta(p_d - p_f - e) + \epsilon(z) \tag{16.5}$$

and $$m = \psi(p_f + e - p_d) + \pi(y) \tag{16.6}$$

In other words, **export growth** depends firstly on how fast domestic prices are changing relative to foreign prices, taking into account variations in the exchange rate (e), multiplied by the price elasticity of demand for exports; and secondly on how fast world income is changing, together with the value of the income elasticity of demand for exports. We rule out here the possibility that developing countries can sell any amount of their goods on world markets at the going price, which would mean that the income elasticity of demand, and what is happening to world purchasing power, does not matter, and that export growth is simply supply determined. This may be true in the case of *some* commodities from some *small* countries, but the proposition that demand does not matter would not stand up to empirical scrutiny as a general rule.

Import growth, likewise, depends firstly on how fast import prices are changing relative to domestic substitutes, (taking account of exchange rate changes), multiplied by the price elasticity of demand for imports; and secondly on how fast domestic income (as a proxy for expenditure) is changing, together with the income elasticity of demand for imports.

Since the growth of imports depends on the growth of domestic income, if we substitute expressions (16.5) and (16.6) into (16.2), (which gives the condition for a moving balance-of-payments equilibrium through time), we can derive an expression for a country's growth of income consistent with current account equilibrium, which depends on certain key variables and parameters. Substitution of (16.5) and (16.6) into (16.2) gives:

$$p_d + \eta(p_d - p_f - e) + \epsilon(z) = p_f + \psi(p_f + e - p_d) + \pi(y) + e \tag{16.7}$$

so that

$$y = \frac{(1 + \eta + \psi)(p_d - p_f - e) + \epsilon(z)}{\pi} \tag{16.8}$$

Before embarking on discussion, let us identify in words what this growth rate depends on, which must be binding if current account deficits cannot be financed:

1 First of all, it depends on the rate at which the *real* terms of trade are changing ($p_d - p_f - e$). The real terms of trade is the ratio of export to import prices measured in a common currency ($P_d/P_f E$). A rise in this ratio, if ($p_d - p_f - e) > 0$, raises real income growth consistent with current account equilibrium (other things constant), and a fall in this ratio lowers the balance-of-payments equilibrium growth rate. This is the **pure terms of trade** effect on income growth.

2 Secondly, if the real terms of trade are changing, the growth rate depends on the price elasticities of demand for exports (η) and imports (ψ), which determine the magnitude of the volume response of exports and imports to relative price changes.

3 Thirdly, one country's growth depends on the growth rates of other countries (z) – which illustrates nicely the mutual interdependence of the world economy – but the rate at which one country grows relative to others depends crucially on the income elasticity of demand for its exports (ϵ), which depends on the tastes of foreign consumers; the characteristics of goods, and a whole host of non-price factors which determine the demand for goods in international trade. One of the major reasons why some countries have a healthier balance of payments and a higher growth rate than others is related to the characteristics of the goods that they produce and export in world trade.

4 Fourthly, the growth rate depends on a country's appetite for imports as measured by π, the income elasticity of demand for imports. The higher π, the lower the growth rate consistent with balance-of-payments equilibrium on current account.

One can see in these factors the rationale for agreements to maintain the terms of trade for developing countries; for exchange rate policy; for international Keynesianism to maintain the growth of world income, and for policies to induce structural change, through export promotion or import substitution, in order to raise the income elasticity of demand for exports and to reduce the income elasticity of demand for imports. Let us take up some of these issues in turn.

■ The Terms of Trade

The effects of terms-of-trade deterioration (import prices rising faster than export prices, other things remaining the same) is to worsen the balance of payments at a given rate of growth or, what amounts to the same thing, to reduce the rate of growth of income consistent with current account equilibrium. For example, if in equation (16.8), import prices were rising at 10 per cent per annum, while the price of exports was rising at only 5 per cent per annum this would mean a lower y than if the terms of trade were constant. In theory this 'terms-of-trade effect' could be offset by a continual **appreciation** of the currency, i.e. by a continual percentage fall in E; but very few developing countries, if any, are in a position to appreciate their currencies even if they wanted to. Terms-of-trade stability in real terms must depend or rely on international commodity agreements to stabilise the prices of the exports of developing countries relative to the prices of the goods they import. Within this framework of analysis the rationale for terms-of-trade agreements is apparent.

It is not clear, however, that terms-of-trade deterioration is always a bad thing, because what happens to export earnings and import payments, and hence to the balance-of-payments equilibrium growth rate, depends not only on changes in relative prices but also on the volume response of exports and imports to price changes. Since the price elasticities, η and ψ, are defined as negative, it can be seen from equation (16.8) that if their sum exceeds -1, $p_d < p_f$ will mean that y is higher than would be the case if $p_d \geqslant p_f$. In other words, the export and import volume response from domestic export prices rising slower than import prices is sufficient to offset the fact that more has to be paid for a given volume of imports relative to exports. If, however, the price elasticity of demand for the exports of a developing country is low because of the nature of the product in question (e.g. a primary product), and the price elasticity of demand for imports is also low because the imports are necessities, the balance of payments will worsen if the terms of trade deteriorate, and growth will have to be constrained for the preservation of balance-of-payments equilibrium. In these circumstances, commodity agreements assume great importance and ideally it would be of benefit if the ratio of export prices to import prices could rise. We have already considered in the previous chapter various commodity schemes which attempt to stabilise export prices or to change the relative price of exports and imports. We also noted that this will not necessarily stabilise export earnings if there are fluctuations in export supply. The international response to this has been to devise schemes to compensate for loss of export earnings. The two major schemes in existence are the IMF's Compensatory and Contingency Financing Facility (see later) and the EEC Stabex scheme which provides compensation to countries for shortfalls of export earnings from particular commodities exported to EEC countries (as already described). UNCTAD's Integrated Programme for Commodities would combine both approaches to the developing countries' 'commodity problem' by setting up a Fund for financing buffer stock schemes to support prices, and for compensatory finance to maintain the value of export earnings.

Another argument for stabilising the export prices of developing countries and maintaining their incomes is that price and income instability tends to depress the world economy at large and the developing countries with it, given the mutual interdependence of the world economy. Falling prices and incomes in developing countries reduces the purchasing power over industrial goods, inducing recession, while rising commodity prices may also induce recession, by raising the price of manufactured goods and inducing deflation in the developed countries. For the smooth growth of the world economy, there is a lot to be said for attempting to stabilise primary product prices so that the purchasing power of the producers and exporters of these commodities grows in line with supply. One suggestion is that the new international money called Special Drawing Rights (SDRs) (see later) might be used to purchase primary products to stabilise their price in times of glut.

The Exchange Rate and Devaluation

Now let us suppose that export prices do rise faster than import prices, improving the terms of trade, but the sum of the price elasticities of demand for exports and imports exceeds unity, what then? This will worsen the balance of payments and reduce the balance-of-payments equilibrium growth rate. It is in these circumstances that **exchange rate depreciation** may become relevant, and is often resorted to. It can be seen from equation (16.8) that if a country has a rate of price increase above that of other countries ($p_d > p_f$), this can in principle be compensated for by allowing the exchange rate to fall continually ($e > 0$) by the difference between p_d and p_f in order to hold 'competitiveness' steady. The conventional theory of balance-of-payments adjustment, and the policy pursued relentlessly by the IMF in countries experiencing balance-of-payments difficulties, is one of downward adjustment of the exchange rate. Note well, however, that the rationale of such a policy presupposes a number of things: (i) that the source of the difficulties is price uncompetitiveness; (ii) that the price elasticities are 'right' (i.e. sum to greater than unity) for a depreciation to reduce the imbalance; (iii) that the *real* terms of trade (or the *real* exchange rate) can be changed by devaluation. A fall in the nominal exchange rate, however, i.e. $e > 0$, may either lead to a fall in $P_f(p_f < 0)$ or a rise in $P_d(p_d > 0)$, both of which would nullify the effect of the devaluation (see equation (16.8)). A fall in P_f might come about if foreigners desired to maintain their competitiveness as the devaluing country became more competitive. A rise in P_d may come about as the domestic price of imports rises as a result of devaluation, which is then followed by a wage–price spiral. Either way, within a short space of time, relative prices measured in a common currency may revert to their former level and devaluation will have been abortive in this respect. A study by Edwards (1989) has looked at the effectiveness of devaluation in reducing a country's *real* exchange rate. He takes 39 cases of devaluation in 25 developing countries between 1962 and 1982, and finds that in most cases devaluation was eroded by domestic inflation within three years. Devaluation must be backed by restrictive monetary and fiscal policy if it is to be effective, but this can lead to unemployment.

Note also that a *once-for-all* devaluation or depreciation of the currency cannot put a country on a *permanently higher* growth path consistent with balance-of-payments equilibrium. Currency depreciation would have to be continuous (i.e. $e > 0$ permanently) for this to happen, unless devaluation can somehow induce favourable structural changes at the same time. Countries must look very carefully at the conditions prevailing before embracing currency devaluation with equanimity, and as the panacea for the relief of balance-of-payment constrained growth.

The studies that have been done of the effect of currency devaluation on the performance of the balance of payments generally find some improvement, but the studies must be treated with some caution. Some of the studies do not hold other things constant in analysing the effect of the exchange-rate change, and none address themselves to the question of whether the policy has enabled the country to *grow permanently* faster consistent with balance-of-payments equilibrium. Cooper (1971) has examined the impact of 24 devaluations in 19 developing countries. In 15 cases there was some improvement in the current balance within 12 months, but the magnitude of the improvement was invariably small. In another study, Bhagwat and Onitsuka (1974) examine the experience of 50 devaluations in 46 countries. They reach mixed conclusions. Exports appear on balance to have benefited, but imports apparently grew faster after devaluation than before. They stress also that effective devaluation was very often less than the nominal devaluation because exporters raise domestic prices, and importers lower foreign prices in order to remain competitive.

Currency depreciation suffers a number of dangers and drawbacks. By raising the domestic price of imported goods, it can be a highly inflationary policy for an open economy which is heavily dependent on imports. Sir Roy Harrod (1967) once described devaluation as 'the most potent known instrument of domestic price inflation which has such sorry effects on human misery'. Many less developed countries may feel inclined to agree as a result of experience, and some countries have had the courage to resist IMF support which has been conditional on devaluation. Tanzania's battle with the IMF in 1979 provides an interesting case study. Secondly, the effect of currency devaluation is to make countries more competitive in the range of goods that have been the source of balance-of-payments difficulties in the first place. A devalued currency may be appropriate to encourage the export of new (manufactured) goods with a high price elasticity in world trade, but it may be inappropriate applied to the traditional range of goods produced and exported with a low price elasticity of demand. For example, if the country is a large supplier and a price maker in world markets, currency devaluation coupled with a low price elasticity will *reduce* export earnings. If the country is a price taker, devaluation will raise the domestic price of the commodity and cause inflation. It is true that production for export will become more profitable and may encourage a greater supply response, but there are other less inflationary ways to encourage supply than devaluation. An optimal exchange rate strategy for a developing country needs to recognise the **dual structure** of most of the countries and to recognise that a single exchange rate for all commodities may not be appropriate. Either a **dual exchange rate** is required, or some system of taxes and subsidies to achieve the same effect.[1] Under a dual exchange rate system a fixed (official) rate could apply to primary commodity exports (and to essential imports to keep their domestic price low) and a free (devalued) rate could apply to manufactured exports with a high price elasticity of demand (and to inessential imports). With a foreign exchange shortage, the free rate would produce a domestic price of foreign exchange well above the official rate. The higher the free rate, or the greater the degree of devaluation, the greater the encouragement to manufactured exports and the greater the discouragement to inessential imports. The major administrative problem with dual exchange rates is to separate the two markets, to ensure that export proceeds from primary commodity exports are surrendered at the official rate and to ensure that foreign exchange bought at the official rate is used for essential imports. The former can be achieved through State Marketing Boards; the latter through strict licensing. Currency auctions – selling foreign exchange for non-essential purposes to the highest bidder – is another form of dual (or multiple) exchange rate policy. In 1992, as many as twenty developing countries were practising dual or multiple exchange rates applying to different current or capital transactions. In the early days of the IMF, dual and multiple exchange rates were discouraged and frowned upon as interferences with free trade and exchange, but in more recent years greater tolerance has been shown.

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[1] A classic early reference arguing the case for dual exchange rates is Kaldor (1964).

With the generalised floating of currencies in the world economy since 1972, most less developed countries allow their currencies to float, but not independently. Some remain pegged to individual currencies, such as the pound or the dollar, which themselves float against other currencies. This is potentially dangerous since the effective exchange rate of the developing country may then move in a direction which is inappropriate in relation to its balance-of-payments position. Some countries peg their currency to a weighted average of other currencies where the weights reflect the importance of imports into the country. Other countries peg their currency to the Special Drawing Right (SDR), the value of which (since 1981) is determined by a trade-weighted basket of 5 major currencies. Studies show that for many less developed countries, the SDR peg does not differ very much from the import-weighted peg. The degree to which currencies are allowed to float is very much a matter for the individual country concerned, and no general rules can be laid down, except to say that the greater the premium placed by the country on internal stability the more desirable exchange rate stability is likely to be.[1]

The IMF Supply-Side Approach to Devaluation

Devaluation, as well as permitting a reduction in the foreign currency price of exports, may also increase the profitability of exporting by raising the price of tradable goods relative to the price of non-tradables, and providing exporters with more domestic currency per unit of foreign exchange earned. The IMF, having conceded that the price elasticity of demand for many of the goods exported and imported by developing countries (particularly as a group) is low, now increasingly uses this supply-side argument as a justification for devaluation. If output is stimulated, this will also mitigate to a certain extent the contraction of aggregate monetary demand that results from devaluation and any accompanying expenditure reducing policies.

The IMF supply-side approach to devaluation was first articulated in public form by Nashashibi (1980) with reference to the Sudan. The approach first requires the calculation of foreign exchange earnings per unit of domestic resources employed for a range of tradable goods. Export (and import substitute) activities can then be arranged on a profitability scale and, according to the supply-side argument, the appropriate devaluation is the one that goes down the scale far enough to ensure the profitability of traditional exports, as well as (perhaps) to encourage new activities. Thus, if the current exchange rate for the Sudan was, say, US \$2 to S£1, and foreign exchange earnings per unit of domestic resources were calculated to be less than this for most commodities, it is clearly unprofitable to produce for export, and the exchange rate should be devalued to bring the production of tradables within the margin of profitability. Foreign exchange earnings per unit of domestic resources are measured as:

$$C = \frac{(P_x X - P_m M)\, r}{P_d D} \qquad (16.9)$$

where X is exports, P_x is the world price of exports in domestic currency, M is the quantity of imported inputs, P_m is the price of imported inputs in domestic currency, D is the amount of domestic resources used in production, P_d is the price of domestic inputs, and r is the exchange rate measured as the foreign price of domestic currency. If $C < r$, production is not profitable at the existing exchange rate.

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[1] For useful surveys of exchange rate policy in developing countries, see Crockett (1977); Johnson (1976); and Argy (1990).

It is clear from equation (16.9) that if devaluation is to improve profitability, it must raise $(P_x X - P_m M)/P_d D$ by more than in proportion to the reduction in r. Unfortunately, this cannot be taken for granted. It depends on the response of P_x X, P_m M, P_d and D to the change in r. The implicit assumptions underlying the approach are that developing countries are price takers, so that P_x will rise in proportion to the devaluation, that X will increase, that M will decrease, and that these favourable effects will not be offset by rises in P_m and $P_d D$. In practice there may not be complete 'pass through' of devaluation to export prices (P_x); the elasticity of export supply may be very low because of structural rigidities and factor immobility, and the elasticity of import prices and domestic prices may be very high. The end result may be that the profitability of exporting remains largely unchanged. This was the conclusion from a detailed study of devaluations in the Sudan by Dr Hussain and the present author (1984) which looked at the profitability of long and medium staple cotton, groundnuts, sesame and gum arabic.

The Sudan, and many other developing countries, correspond to the 'rigid country' case distinguished by Branson (1983) in his useful taxonomic discussion of trade structures and devaluation, in which the countries produce agricultural-based raw materials with low supply elasticities and where the demand for imports is very inelastic in the short run, particularly for imports used as intermediate inputs. In addition, the price elasticity of demand for exports may be large but not infinite, and real wages may be sticky. In these circumstances, devaluation may be a second-best policy compared to 'structural' intervention to raise foreign exchange earnings per unit of domestic inputs.

The Growth of World Income and Structural Change

Now let us turn to the growth of world income – z in equation (16.8). There is little individual countries themselves can do about the growth of world income, but since all countries are linked through trade, the interdependence of countries and the importance of global prosperity is only too apparent. This should be the overriding function of supranational institutions and mechanisms; to keep world income and trade buoyant in the face of exogenous shocks and to avoid the beggar-thy-neighbour policies which characterised the era of the 1930s when the whole world economy slumped. The inspiration behind the IMF was to avoid a repetition of the 1930s – to help countries in balance-of-payments difficulties and to avoid recourse to widespread protection which exports unemployment from one country to another in a downward spiral. It is the same inspiration which underlies plans today for the recycling of export surpluses and for managed trade, to relieve the balance-of-payments constraint on growth in countries with a tendency to chronic deficit, while other countries are in perpetual surplus. This was a major theme of the Brandt Report, discussed in Chapter 1. Whatever may be said about the wisdom of the activities pursued by the IMF in developing countries, there can be no doubting the role that the IMF played in the post-war years in providing the confidence and the means for the world economy to grow at an unprecedented rate.

While individual countries have no control over the growth of world income, they do have some control over the income elasticity of demand for their exports, which determines how fast exports grow as a result of world income growth. Likewise, countries have some control over the income elasticity of demand for imports, because both these parameters are a function of the type and characteristics of the goods being produced for sale in international trade. Thus, they are a function of the economic (trade) strategy being pursued. We discussed in Chapter 15 export promotion versus import substitution strategies.

Table 16.2 ***A Comparison of the Growth Experience of Countries Compared with the Growth Rate Predicted by the Balance of Payments Constrained Growth Model***

Country		*Actual growth rate (y) (per cent p.a.)*	*Export growth rate (x) (per cent p.a.)*	*Income elasticity of demand for imports (π)*	*Predicted growth rate (x/π)*
Brazil	1964–85	7.0	15.1	1.5	10.0
Colombia	1961–85	4.8	9.5	1.9	4.9
Cyprus	1961–84	5.3	11.5	1.7	6.7
Greece	1961–85	5.2	14.4	1.1	13.0
Hungary	1971–85	3.9	11.6	2.8	4.0
Indonesia	1966–85	6.5	21.4	2.7	7.9
Israel	1962–85	5.7	13.8	2.4	5.1
Pakistan	1971–85	5.4	15.4	2.9	5.3
Philippines	1961–85	4.4	10.0	2.4	4.1
Singapore	1973–80	8.2	33.2	3.6	9.2
Syria	1964–84	6.3	14.3	2.4	6.0
Thailand	1961–85	6.9	13.3	1.9	7.0
Turkey	1973–83	4.2	20.7	4.1	5.0

Source: Bairam (1990) and Bairam and Dempster (1991).

Import substitution is designed to lower the import elasticity, but there is a limit to import substitution, and the policy itself may lower the export elasticity at the same time by creating a rigid and inefficient industrial structure. A much more fruitful strategy, which has been pursued relentlessly and successfully by several South East Asian countries, is to concentrate on raising the export elasticity, which at the same time may reduce the import elasticity if the goods produced for export also compete with imports.

Application of the Balance-of-Payments Constrained Growth Model

How well does the balance-of-payments constrained growth model outlined in equations (16.1) to (16.8) fit the growth experience of developing countries? Or, to put it another way, how well does equation (16.8) predict the growth performance of the developing countries? Bairam (1990), and Bairam and Dempster (1991), have applied the model to a selection of countries with interesting results. If it is assumed that relative prices in international trade do not change (or the real exchange rate remains constant) then equation (16.8) reduces to $y = \varepsilon z/\pi = x/\pi$, which is often referred to as the **dynamic Harrod trade multiplier** result because it is the dynamic analogue of the static trade multiplier result $Y = X/m$, where Y is the level of income, X is the level of exports and m is the marginal propensity to import. $1/m$ is the foreign trade multiplier. The authors therefore consider how well the growth experience of developing countries can be predicted from their growth rate of exports (x) divided by the income elasticity of demand for imports (π). **Table 16.2** shows the results.

It can be seen that the difference between the actual growth experience (y) and the estimated balance of payments equilibrium growth rate (x/π) is generally small. In other words, the rate of growth of exports relative to the income elasticity of demand for imports is a good predictor of a country's growth performance because, in the absence of a continual positive rate of growth of capital inflows or improvements in the terms of trade, this ratio sets the upper limit to growth. The average discrepancy (excluding Greece) is 0.8 percentage points. These results add weight to the idea and importance of export-led growth that we discussed in the last chapter.

■ Capital Flows

So far we have assumed growth to be constrained by the necessity to preserve current account equilibrium on the balance of payments. In practice, of course, countries are allowed to run deficits, sometimes for substantial periods of time, financed by capital inflows from abroad from a variety of sources. The extent to which the value of imports can exceed the value of exports to finance a correspondingly higher level of income is determined by the *net* level of capital inflows. Thus we may write the equation for the overall balance of payments as:

$$P_dX + C = P_fME \qquad (16.10)$$

where C measures net capital inflows (including reductions in reserves) in domestic currency. Taking rates of change of this identity gives:

$$\frac{E}{R}(p_d + x) + \frac{C}{R}(c) = p_f + m + e \qquad (16.11)$$

where E/R and C/R represent the proportions of total receipts to finance the import bill that come from export earnings (E) and capital inflows (C), respectively. If we now substitute our expressions for x and m (equations (16.5) and (16.6)) into equation (16.11) we can solve for the growth rate associated with overall balance-of-payments equilibrium. This rate will depend on all the factors already mentioned, and in addition on the rate of growth of *real* capital inflows. On substitution we obtain:

$$y = \frac{(1 + \frac{E}{R}\eta + \psi)(p_d + p_f - e)}{\pi} \qquad (16.12)$$

$$+ \frac{\frac{E}{R}(\epsilon(z)) + \frac{C}{R}(c - p_d)}{\pi}$$

Apart from the weight, E/R, attached to the two export elasticities, η and ϵ, the only difference between equation (16.12) and our earlier result in equation (16.8) is the addition of the last term $(c - p_d)$ which measures the growth of real capital inflows (the growth of the nominal flows, c, minus the rate of domestic inflation, p_d). A positive growth of capital inflows will allow a country to grow faster than otherwise would be the case if it was constrained to maintain balance-of-payments equilibrium on current account. On the other hand, it must be said that a continually positive rate of growth of capital inflows implies an *ever growing* burden of debt, which is not sustainable in the long run. Thus, running current account deficits to finance growth is not a long-run feasible option, and other long-run strategies must be pursued related to the determinants of the growth rate consistent with current account equilibrium.[1]

■ The International Monetary System and Developing Countries

The world's international monetary system is governed largely by the International Monetary Fund, which was established at Bretton Woods in 1944 in the aftermath of the great depression of the 1920s and 1930s and in preparation for the peace after the Second World War. There were fears that the protectionism and beggar-thy-neighbour policies that characterised the period after the First World War would rear their ugly heads again to the detriment of the world economy at large, if not all individual countries within it. Thus the IMF was conceived originally as an institution for stabilising the world economy, rather than as an agency for development; lending short term to member countries in temporary balance-of-payments difficulties. The role of development agency was given to the IMF's sister institution, the World Bank, established at the same time. Because the IMF was not allowed to create money, John Maynard Keynes (the joint architect of the IMF) used to complain that his proposal for a bank had become a Fund, and what was in fact a fund had been called a Bank!

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[1] For an application of this extended model to several developing countries, see Thirlwall and Nureldin-Hussain (1982).

Over the years, however, and particularly recently, the role of the IMF has changed. It has increasingly become the bank manager of the poor countries, and much more of a development agency, lending longer term to cover what are now perceived as longer-term structural balance-of-payments difficulties. The role of the World Bank has also been changing and now lends as a means of balance-of-payments support (the traditional preserve of the IMF) for what it calls programmes of structural adjustment (see Chapter 14). The IMF, in turn, instituted in 1986 a Structural Adjustment Facility (see later). The roles of the IMF and World Bank seem to be merging, in recognition of the balance of payments as the major long-run constraint on the growth of output in developing countries.

The developing countries themselves have gained an increasingly powerful voice in the council chambers of the IMF, particularly since the breakdown of fixed exchange rates and the convertibility of the dollar into gold in 1972. The developing countries have strong representation on the 'Committee of Twenty' – the powerful inner cabinet of the IMF – and they now also have their own 'Committee of Twenty-Four'. There is also a separate Development Committee which was set up following a report from the Committee of Twenty in 1974 which argued that the Fund should pay more attention to the needs of the developing countries in making its recommendations and monetary arrangements. This was perhaps the first explicit statement from within the IMF itself that it should be concerned with issues of economic development as well as stability. The Development Committee concerns itself with such issues as the access of the developing countries to the financial and goods markets of the developed countries; the flow of development assistance, and commodity price stabilisation. All these developments have given the developing countries a much louder voice than hitherto in the organisation and reform of the international monetary system.

■ How the IMF Works

The IMF is basically a lending institution. It is a source of three main forms of financial assistance, or liquidity, to developing countries. First, there is the entitlement to drawings within the ordinary facilities provided by the Fund. Secondly, there is entitlement to drawings made under special facilities, and thirdly there is the periodic issue of Special Drawing Rights (SDRs).

Members' drawing rights, their share of SDR allocations, and indeed their subscription to the Fund and voting power are all based on **quotas**. Every member must subscribe to the Fund an amount equal to its quota – 25 per cent in the form of reserve assets and the remainder in local currency. Initial quotas are based on a formula relating to the economic circumstances of individual countries, such as living standards, importance in world trade etc., and are then modified in various ways in the light of the conditions and quotas of other countries. The United States has the largest quota, amounting in 1992 to 26 billion SDRs out of the total value of quota subscriptions of 135 billion SDRs. When countries draw on the Fund, they buy currency they need with their own currency, and then, in repaying, they repurchase their own currency with foreign currency acceptable to the Fund. The size of quotas comes under continual review. Under the 9th General Review of Quotas in 1990, a 50 per cent increase was instituted. The 10th Review of Quotas is due in 1993.

The Fund may supplement its quota resources by borrowing any country's currency. This was institutionalised by the General Agreement to Borrow (GAB) in January 1962, which was a four-year arrangement concluded with ten industrialised countries. Since then, the General Agreement to Borrow has been extended several times. The Fund also borrows from the private capital market and makes bilateral deals with countries. In 1981, for example, an agreement was reached with Saudi

Arabia to provide the Fund with the equivalent of 4 billion SDRs a year for at least two years, and in more recent years there have been various short-term borrowing agreements with national banks.

The Fund also borrows to finance special facilities as a means of recycling the balance-of-payments surpluses of some member countries. The Fund argues that while it has no desire to supplant ordinary commercial banks in the recycling process, its ability to advocate adjustment policies effectively and convincingly in deficit countries is enhanced by the capacity to make substantial financial resources available to member countries. Thus, while the Fund continues to place reliance on quota subscriptions as the main source of its finance, it is also in the market to borrow. Now that the IMF sees its role as providing larger amounts of financing over longer and longer periods for countries with chronically weak balance of payments in relation to their growth objectives, it will have an ever growing need for resources.

A country making use of the Fund's resources is generally required to carry out a programme of balance-of-payments adjustment as a condition of support. This requirement is known as **conditionality** and reflects the IMF principle that financing and adjustment must go hand in hand. What constitutes balance-of-payments equilibrium is not rigidly defined. It need not mean current-account equilibrium, but the measure must be defined free of restrictions on trade and payments in keeping with the underlying liberal free trade philosophy held by the Fund. The enforced programmes of balance-of-payments adjustment typically consist of currency devaluation and restrictions on government expenditure and the money supply, coupled with the liberalisation of trade and monetary movements. These conditionality practices which were developed during the 1950s and 1960s, under pressure from the United States, underwent a comprehensive review in 1968, and then were modified, almost as a matter of necessity, as a result of the disturbances that characterised the world economy in the 1970s, starting with the breakdown of the Bretton Woods system and exacerbated by the rise in oil and other commodity prices between 1971 and 1974. The strain on the balance of payments of the non-oil-producing developing countries caused by these shocks called for a new blend of adjustment and finance. In 1978–9 there was another review of conditionality, and a new set of guidelines was issued. The new guidelines contained a number of innovations. They encouraged members to come to the Fund early before payments problems become acute. They recognised the need for longer period adjustment. The guidelines also made clear (and this was the most important innovation) that the Fund, in helping members to design adjustment programmes, will pay due regard to the social, economic and political characteristics of the country. There was official recognition for the first time that balance-of-payments difficulties associated with an acceptable growth of output may have as much to do with the structural characteristics of countries as with relative price distortions and excessive government expenditure. There is thus a new emphasis on policies to increase productivity and improve resource allocation. Supply-side policies include public sector policies on prices, taxes and subsidies; interest rate policies etc., all of which affect the efficiency of resource allocation and supply potential. Conditionality, it was argued, must also be flexible and adaptable to changing circumstances.[1]

■ Ordinary Drawing Rights

Ordinary drawing rights from the Fund consist of two elements: first the **gold or reserve tranche** which usually represents 25 per cent of a member's quota, which is equivalent to that part of its quota not paid in its own currency; and secondly, the **credit tranche** which is officially equal to 100 per cent of a member's quota, but can go beyond. The credit tranche is split into four parts, and access to higher tranches becomes progressively more difficult and expensive. No conditionality is

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[1] For a comprehensive review of the evolution of the conditionality practices of the Fund, see Guitian (1982), and Dell (1981).

Table 16.3 ***Total Disbursements of the Fund, Repayments and Total Outstanding Credit (millions SDRs)***

	Financial year ended April 30							
	1985	*1986*	*1987*	*1988*	*1989*	*1990*	*1991*	*1992*
				During period				
Total disbursements	**6 060**	**3 941**	**3 307**	**4 562**	**2 682**	**5 266**	**6 823**	**5 903**
Purchases by facility[1]	6 060	3 941	3 168	4 118	2 128	4 440	6 248	5 294
Stand-by and first credit tranche	2 768	2 841	2 325	2 313	1 702	1 183	1 975	2 343
Compensatory financing facility	1 248	601	593	1 544	238	808	2 127	1 381
Extended Fund facility	2 044	498	250	260	188	2 449	2 146	1 571
Loans under SAF/ESAF arrangements	—	—	139	445	554	826	575	608
Special Disbursement Account resources	—	—	139	445	380	584	180	138
ESAF Trust resources	—	—	—	—	174	242	395	470
By region								
Industrial countries	—	—	—	—	—	—	—	—
Developing countries	6 060	3 941	3 307	4 562	2 682	5 267	6 823	5 903
Africa	1 018	842	647	955	701	1 289	577	740
Asia	747	844	1 282	804	469	525	1 714	1 476
Europe	838	323	68	—	338	268	1 960	1 516
Middle East	57	—	—	116	—	66	—	333
Western Hemisphere	3 401	1 933	1 311	2 688	1 174	3 119	2 572	1 838
Repurchases and repayments	**2 943**	**4 702**	**6 749**	**8 463**	**6 705**	**6 399**	**5 608**	**4 770**
Total outstanding credit provided by Fund	**37 622**	**36 877**	**33 443**	**29 543**	**25 520**	**24 388**	**25 603**	**26 736**

Source: *IMF Annual Report* 1992.

attached to reserve tranche drawings, except balance-of-payments need. In the case of credit tranche drawings, the conditions attached to the first tranche normally consist of devising a programme demonstrating a reasonable effort to overcome balance-of-payments difficulties. Requests for purchases of currency in the higher credit tranches require substantial justification. The purchases here are almost always made under **stand-by arrangements** rather than directly, and certain performance criteria relating to government expenditure and money supply targets must normally be met before resources are released. A strong programme is required designed to rectify balance-of-payments disequilibrium.

Up to 1972, ordinary tranche (reserve and credit) drawings were the most important source of Fund support for developing countries' balance of payments. They still are the most important single source of support, but since then other Fund facilities have become increasingly more important. Total purchases in recent years from various sources are shown in **Table 16.3**.

The total level of disbursements is seen to vary from year to year, but has averaged approximately 5 billion SDRs over the period 1985–92. By region, the major recipient has been the Western Hemisphere including mainly Latin America. Credit and loans have to be repaid, however, and it can be seen that, in some years, repurchases and repayments exceeded new disbursements e.g. the period 1986–90. The total outstanding credit is a massive 26.7 billion SDRs. In 1992, over 80 countries were in debt to the IMF.

Special Facilities

Apart from the ordinary drawing rights, developing countries have access at any particular time to a number of special facilities that may exist at the time to assist them with the development difficulties arising from balance-of-payments problems. There are four permanent facilities – the Compensatory and Contingency Financing Facility, the Buffer Stock Financing Facility, the Extended Fund Facility and the Structural Adjustment Facility – and there exists, or has existed, a number of temporary facilities established with borrowed resources, such as the Oil Facility, the Subsidy Account, the Trust Fund, the Supplementary Finance Facility and Enlarged Access Policy. As of 1990, the guidelines on the scale of Fund assistance to countries provide for members to have annual access to fund resources up to 150 per cent of their quotas or up to 450 per cent over a three-year period. Members' cumulative access, net of scheduled repurchases, would be up to 600 per cent of quotas. These drawings exclude drawings under the old Compensatory Financing Facility and the Buffer Stock Financing Facility and outstanding drawings under the Oil Facility. All assistance is related to quotas, but quotas, of course, may bear no relation to need. Let us now consider the working of these special Facilities.

Compensatory and Contingency Financing Facility (CCFF)

This facility changed its name in 1988 from the Compensatory Financing Facility, which was the first special facility established by the Fund in order to compensate developing countries for shortfalls of export earnings below a five-year trend centred on the middle year. Originally, the facility enabled a country to draw up to 25 per cent of its quota, provided the shortfall was temporary, but now it can draw up to 83 per cent – additional to drawings made under tranche facilities. Requests for drawings above 50 per cent of quota, however, are met only if the Fund is satisfied that the country is co-operating in an effort to correct balance-of-payments disequilibrium. To give an example of how the Facility operates: in the year February 1976 to February 1977, 42 countries were affected by shortfalls in export earnings from 12 major commodities: copper; wool; beef and veal; cotton; rubber; timber; sugar; tin; alumina and bauxite; phosphates; jute, and coconut products. The export earnings shortfall below trend was 3183 million SDRs or 17 per cent of export value, and the 42 countries affected drew from the Fund 2100 million SDRs in compensation. Between 1963 and 1992 approximately 20 billion SDRs were drawn altogether. The facility has been extensively used since 1975, and **Table 16.3** gives figures for the most recent years.

In 1979 shortfalls in receipts from travel and workers' remittances were included in the compensation scheme, and then in 1981 it was extended to cover the increased cost of imported cereals, calculated as the cost of such imports in a given year less their average cost for the five years centred on the year. Under this 'integrated scheme' of export shortfalls and excess import costs, countries could draw up to 105 per cent of quota.

In 1988, the name of the facility was changed and extended to cover fluctuations in foreign exchange earnings and payments brought about by other factors such as changes in import prices other than cereals, interest rate changes etc., as well as tourist receipts and migrants' remittances. The purpose was to encourage member countries to undertake long-term adjustment programmes with greater confidence (i.e. without external disruption). Compensation under the new scheme will be more immediate, and up to 122 per cent of quota. The scheme is activated when a foreign exchange disturbance amounts to more than 10 per cent of quota.

Buffer Stock Financing Facility (BSFF)

This facility was introduced in June 1969 to assist the developing countries in financing their contributions to various international buffer stock schemes, such as have existed for tin and sugar. Countries may draw up to 45 per cent of their quota. The facility was little used up to the end of 1976, with only 30 million SDRs drawn by five countries. Since then it has been more extensively used, but as can be seen from **Table 16.3** the sums involved have been relatively small. The conditionality attached to drawings are the same as under the CCFF scheme, namely co-operation with the Fund to find appropriate solutions to balance-of-payments difficulties.

■ Extended Fund Facility (EFF)

This facility was established in 1974 to allow developing countries to borrow beyond quota over longer periods than are allowed under ordinary drawing rights. The EFF arrangement gives members assistance for up to three years with repayment provisions extending over a range of four to ten years. Drawings under the EFF may be up to 140 per cent of a country's quota over a three-year period, but the conditions are stringent. The country must provide a detailed statement of policies and measures every twelve months. The resources are provided in instalments with performance criteria attached. None the less, the facility represented an important and significant shift in emphasis from viewing the balance of payments as a stabilisation problem, to recognising the balance of payments as a fundamental long-term constraint on growth with cannot be rectified, if at all, in a short period of time. Access to the facility was improved in 1988. Drawings over the period 1974 to 1992 have amounted to approximately 25 billion SDRs.

■ Supplementary Financing Facility (SFF)

This facility was established in 1977 to act as a temporary measure to assist countries facing large external imbalances in relation to their quotas, pending the 7th General Review of Quotas which ultimately provided for a 50 per cent increase. The facility was funded by resources borrowed by the Fund from members in strong payments positions, amounting to 8 billion SDRs from 13 countries. As a result, the amount of Fund assistance that members could obtain under stand-by arrangements doubled from 100 per cent and 140 per cent of quota, respectively, to 200 per cent and 280 per cent of quota. The stand-by arrangements using these supplementary funds were allowed to cover periods longer than the traditional one year; the loans were at market rates of interest, and had to be repaid within seven years. The conditionality attached was basically the same as that applied to higher tranche drawings.

To reduce the cost to low-income countries of using the SFF, a subsidy account was established in 1980, financed through voluntary donations and the repayment of loans from the Trust Fund that was established in 1976 (and terminated in 1981) to provide the poorest developing countries with concessional financial assistance provided by profits from Fund gold sales.

■ Enlarged Access Policy (EAP)

In March 1981 a policy of enlarged access to the Fund's resources was adopted whereby after all supplementary financing had been committed and additional borrowing arrangements had been considered, the Fund would continue to provide assistance on a scale similar to that under the SFF. The limit on borrowing is now 270 or 330 per cent of quota over a three-year period and a cumulative limit of 400 or 440 per cent of quota net of repurchases and excluding drawings under the Compensatory and Contingency Financing Facility and Buffer Stock Facility. Such drawings are subject to the relevant policies of the Fund, including those on conditionality, phasing, and performance criteria.

■ Structural Adjustment Facility (SAF)

In March 1986 the IMF's Structural Adjustment Facility was instituted to provide assistance on concessional terms to low-income developing countries facing protracted balance-of-payments problems that agree to undertake medium-term structural adjustment programmes to foster economic growth and strengthen the balance of payments. Eligible countries must prepare a three-year adjustment programme set out in what is called a 'policy framework paper' (PFP). Loans are for ten years with a grace period of five and a half years with an interest rate of only 0.5 per cent compared with a charge of 6 per cent for most Fund facilities. Initially, finance was available from the repayment of Trust Fund loans mentioned earlier. In 1987 an Enhanced Structural Adjustment Facility (ESAF) was created to provide 6 billion SDRs additional resources to assist adjustment in heavily indebted low-income countries.

The amount of drawing under each of the facilities mentioned above, as a percentage of each member's quota is shown in **Table 16.4**.

On p. 404 there is a summary taken from the IMF itself on the financial assistance that the IMF gives and the conditions that it imposes.

Table 16.4 ***Potential Cumulative Disbursements Under Arrangements and Facilities (per cent of member quotas)***

Under stand-by and extended arrangements[1,2]	
Annual	90–110
Three-year	270–330
Cumulative	400–440
Special facilities	
Compensatory and contingency financing facility (CCFF)	
Export shortfall[3]	40
Excess cereal import costs[3]	17
Contingency financing[4]	40
Optional tranche[3,5]	25
Combined[6]	122
Buffer stock financing facility	*45*
Under SAF and ESAF arrangements	
Structural adjustment facility	
First year	20
Second year	30
Third year	20
Cumulative	70
Enhanced structural adjustment facility[1]	
Cumulative	*250*

[1] Under exceptional circumstances, the amounts disbursed may exceed the limits shown.

[2] The application of the lower access limits was temporarily suspended as of November 1990 until December 31, 1991.

[3] Until end 1991, access for export shortfalls, cereal import excesses, and the optional tranche could alternatively be used to compensate an excess in oil import costs.

[4] A sub-limit of 35 per cent of quota applies on account of deviations in interest rates.

[5] May be applied to supplement the amounts for export shortfalls, excess in cereal imports costs, or contingency financing.

[6] When a member has a satisfactory balance of payments position – except for the effect of an export shortfall or an excess in cereal costs; a joint limit of 105 per cent of quota applies.

Source: *IMF Survey*, Supplement 1991.

■ Criticisms of the Fund[1]

The policy prescriptions of the Fund in developing countries have been, and still are, based on a blend of finance and adjustment. Few would dispute the need for international institutions to provide finance to ease the burden of balance-of-payments adjustment. In its adjustment policies, however, the Fund has come in for severe criticism; so much so, that it has been described as '**anti-developmental**'. In its approach to adjustment the Fund is conditioned both by the beliefs and philosophy of the Fund itself and the prevailing orthodoxy of neoclassical economic theory. The Fund denies that it has a rigid doctrinaire approach to economic policy, but it clearly has a particular philosophy. The Fund is a major bastion of support, as Keynes envisaged, of an international economic

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[1] For a strong critique of the activities of the Fund in developing countries, see Payer (1974). For a spirited defence of the Fund against its critics, see Nowzad (1981).

IMF Provides Financial Assistance to Overcome Balance of Payments Difficulties

Purchases and Repurchases

A member country makes a purchase, or drawing, from the IMF by exchanging its own currency for an equivalent amount of other members' currencies or special drawing rights (SDRs) held by the IMF. Over a prescribed period, the country is required to repurchase – buy back – its own currency from the IMF with other members' currencies or SDRs. The IMF levies charges on purchases, and the net effect of a member's purchase and its subsequent repurchase is very similar to that of its receiving a loan at interest and subsequently repaying it.

Tranche Policies

First Credit Tranche. Member demonstrates reasonable efforts to overcome balance of payments difficulties in program. Purchases are not phased and performance criteria are not required. Repurchases are made in 3 ¼–5 years.

Upper Credit Tranches. Member must have a substantial and viable program to overcome its balance of payments difficulties. Resources normally provided in the form of stand-by arrangements that provide purchases in installments linked to the observance of previously specified performance criteria. Repurchases are made in 3 ¼–5 years.

Extended Fund Facility

Medium-term program aims at overcoming structural balance of payments maladjustments. A program generally lasts for three years, although it may be lengthened to four years where this would facilitate sustained policy implementation and achievement of balance of payments viability over the medium term. Program initially identifies policies and measures for first 12-month period in detail. Resources are provided in the form of extended arrangements that include performance criteria and drawings in installments. Repurchases are made in 4 ½–10 years.

Enlarged Access Policy

Augments resources available under stand-by and extended arrangements. Applicable policies on conditionality, phasing, and performance criteria are the same as under the credit tranches and the extended Fund facility. Repurchases are made in 3 ½–7 years.

Structural Adjustment Facility

Resources are provided on concessional terms to low-income developing member countries facing protracted balance of payments problems, in support of medium-term macroeconomic and structural adjustment programs. Member develops and updates, with assistance of the Fund and the World Bank, a medium-term policy framework for a three-year period, which is set out in a policy framework paper (PFP), Detailed annual programs are formulated prior to disbursement of annual loans and include quarterly benchmarks used to assess performance. Repayments are made in 5 ½–10 years.

Enhanced Structural Adjustment Facility

Objectives, eligibility, and basic program features of this facility parallel those of the structural adjustment facility (SAF); differences relate to provisions for access, monitoring, and funding. A PFP and a detailed annual program are prepared each year. Arrangements include quarterly benchmarks, semiannual performance criteria, and, in most cases, a midyear review. Adjustment measures are expected to be particularly strong, aiming to foster growth and to achieve a substantial strengthening of the balance of payments position. Loans are disbursed semiannually, and repayments are made in 5 ½–10 years.

Compensatory and Contingency Financing Facility

The compensatory element provides resources to a member for a shortfall in export earnings or an excess in cereal import costs that is due to factors largely beyond the member's control. The contingency element helps members with IMF-supported adjustment programs to maintain the momentum of adjustment efforts in the face of a broad range of unanticipated, adverse external shocks. Repurchases are made in 3 ¼–5 years.

Buffer Stock Financing Facility

Resources help finance a member's contribution to an approved international buffer stock scheme. Repurchases are made in 3 ¼–5 years.

Source: *IMF Survey*, September 1992.

system that prefers capitalism to socialism; which favours private investment over public investment; which extols the virtues of free trade and the operation of the price mechanism, and which encourages the free flow of private capital to and from developing countries. All this colours to a certain degree its diagnosis of balance-of-payments problems and their appropriate solution. Deficits are invariably seen as related to, or caused by, price uncompetitiveness and excess monetary demand, to be 'cured by' devaluation and demand contraction. But as Buira (1983) notes, in an authoritative analysis of conditionality, the Fund still lacks a comprehensive theoretical apparatus to deal with two basic questions regarding devaluation. First, how is the degree of overvaluation of a currency determined? And secondly, how is the optimal pace of adjustment from the overvalued to the equilibrium rate of exchange decided? Then in keeping with the Fund's philosophy, devaluation and retrenchment are coupled with other measures which, from a balance-of-payments point of view, work in the opposite direction; namely, the relaxation of foreign exchange controls, the removal of import restrictions and the dismantling of subsidies and price controls. The critics argue with some justification that there is one law for the poor and another for the rich. While the poor countries must remove controls over foreign exchange and imports as a condition of assistance, the rich countries continue to impose restrictions against the imports of goods from developing countries. To support the liberalisation programme, the country then has to depress aggregate demand sufficiently to accommodate devaluation in the attempt to achieve balance-of-payments equilibrium, which leads to slow growth and unemployment.[1] The symptoms of balance-of-payments disequilibrium are tackled, but not the root causes of the perpetual tendency towards disequilibrium. As we argued in the previous chapter, the balance-of-payments problems of most developing countries must be regarded as primarily structural in nature relating to the characteristics of the goods produced and traded. This implies a very different approach to balance-of-payments adjustment than one of continual devaluation, demand contraction and dismantling of the public sector. At the very least it calls for dual exchange rates, and for policies, using a judicious mix of subsidies and controls, to alter the structure of production.

The effects of the Fund's programmes on countries' economic performance have been very mixed. Reichmann and Stillson (1978) examined the effects of IMF programmes in both developed and developing countries in the period 1963 to 1972, comparing the two years after the implementation of the programme with the two years before. Taking the balance of payments as a whole (current plus capital account), of 75 cases examined, only 18 cases showed a statistically significant improvement and 4 showed an actual worsening. In 29 cases when the inflation rate exceeded 5 per cent before the programme, the inflation rate worsened in 6 cases and in 16 cases there was no significant change. As far as GDP growth is concerned, of 70 cases examined the performance improved in 33 cases, but deteriorated in 28 cases. A study by Donavan (1982) of the non-oil-developing countries for the period 1971–80 reveals a similar pattern: some improvement in the balance of payments; mixed effects on growth, and some tendency towards inflation.

Following a major analysis of over thirty IMF stabilisation programmes supported by upper-tranche credits between 1964 to 1979, Killick and his associates (1984) advocated what they call a 'Real Economy Approach to Balance of Payments' or 'adjustment with growth', which would be a more flexible supply-orientated approach with demand management subservient. One of the purposes of the Extended Fund Facility and the Structural Adjustment Facility is to permit the Fund to deal with structural disequilibrium, but as far as the former Facility is concerned, the structural adjustment programmes have been no different from conventional demand management programmes built around monetary and fiscal contraction coupled with trade liberalisation and some production incentives. All performance criteria have been based on traditional demand management instruments (Buira (1983)). The most appropriate conditionality required for structural adjustment programmes does not seem to have been fully worked out. The final point that needs making is the crucial role of the Fund staff in the design of financial programmes. The power exercised by one or two staff technicians involved in the negotiations can be considerable, but also very damaging if national policy-makers are not persuaded by the arguments. Programmes entered into under duress normally fail.

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[1] For the adjustment experience of thirteen individual countries in the 1970s see Dell and Lawrence (1980). See also Killick (ed.) (1982).

The most recent study of Fund stabilisation experience is by the structuralist development economist Lance Taylor (1988). He reports the results of studies of eighteen countries done under the auspices of the World Institute of Development Economic Research (WIDER) in Helsinki. The principal finding of the authors of the country studies is that 'past policies could have been designed to better effect, and that programmes of the Fund/Bank type are optimal for neither stabilisation nor growth and income redistribution in the Third World'. This is a serious indictment of policy from some of the world's leading development economists. There are alternative programmes to those implemented by the IMF, but they would be more interventionist, and be concerned more directly with the targets themselves than with the precise instruments. There is a role for selective import controls, export subsidies, multiple exchange rates, low interest rates etc. but these are all frowned on by the IMF.

Another criticism of the Fund is that it ignores 'structural' surpluses on the balance of payments – the counterpart of 'structural' deficits – and critics argue that the burden of adjustment ought to be shared more equitably between deficit and surplus countries, instead of the major part of the burden being shouldered by debtor developing countries, as at present. If surplus countries do not attempt to adjust by expanding their own economies or appreciating their currencies, deficit countries ought to be allowed to discriminate against the goods of these countries. This would be a revival of the idea of 'scarce currencies', and of the right of countries to control imports from 'scarce currency' countries, i.e. from those with surpluses.

Lastly, the critics would argue that if the Fund is genuinely concerned with development as well as providing balance-of-payments support, it could distribute all new issues of Special Drawing Rights (SDRs) to developing countries to spend in developed countries who, after all, if they did not earn their reserves by selling goods to developing countries in exchange for SDRs, would have to earn them in some other way. We take up this matter later.

■ The Recycling of Oil Revenues

The major contributory factor to the balance-of-payments difficulties of developing countries in the 1970s was the massive increase in the price of oil, which in turn gave the oil-producing countries huge balance-of-payments surpluses. The price of oil rose from $1.80 per barrel in 1973 to $9.50 in 1974, and rose by another $12 per barrel in 1979. In 1981 the price went to over $30 per barrel, and at the time of writing it is $20. The immediate impact of a rise in the price of an inelastic commodity like oil is to transfer income from the consuming to the producing country. Unless there is an immediate transfer back, income and employment will contract in the consuming country. This is part of the balance-of-payments adjustment mechanism and will continue to the extent that the deficit in the consuming country is not (or cannot) be financed by capital inflows. The producers have counterpart surpluses. The concern is whether the surpluses are used to finance the deficits of the countries most in need.

After the first oil price increase in 1973–4, the bulk of the oil producers' (OPEC) surpluses were invested in certificates of deposit in the Eurodollar market and in American and British government stocks. But since 1978, and after the further price rise in 1979, more of the surpluses have been used directly to finance the deficits of developing countries on concessional terms.

Several developmental agencies have been set up by the oil producers to channel developmental assistance, both multilateral and bilateral. Among the multilateral agencies are the Arab Fund for Economic and Social Development, the Arab Bank of Economic Development in Africa (BADEA), the Islamic Development Bank, and the OPEC Fund for International Development. Together they committed over $10 billion in the 1980s. In addition, there are several bilateral funds including the Kuwait Fund for Arab Economic Development, the Abu Dhabi Fund for Arab Economic Development, the Iraqi Fund for External Development, the Venezuelan Investment Fund, and the Saudi Fund for Development, which have committed over $25 billion since their establishment. Of the total amount distributed by OPEC agencies, over $10 billion has gone to Africa, over $10 billion to Asia and $3 billion to Latin America.

Apart from concessional transfers, there are many ways in which non-concessional transfers might be facilitated to divert the investment of surpluses from the capital markets of developed countries. Commercial recycling, through the Eurocurrency market, for example, is both too short-term and too expensive for most developing countries. A completely new **Third World Development Fund**, issuing marketable securities, would be one possibility to channel funds currently tied up in the international capital market. It is much more sensible from a world point of view for surpluses to be invested in developing countries who demand goods from the industrialised countries than for the money to be invested in American or British government securities. Failing such a Fund, what are required are institutional mechanisms for guaranteeing loans to poor countries, and perhaps subsidising interest rates, so that the poorer countries can gain easier access to the commercial market. Joint ventures through investment companies in poor countries might be another possibility. As long as the price of oil rises, with demand for oil price inelastic, and the oil producers find it difficult to dispose of their surpluses by spending on goods in poor countries, the constraining effect of these surpluses on poor developing countries will remain acute, and the need for recycling mechanisms will persist.

Special Drawing Rights and the Developing Countries

One possibility for increasing the flow of resources to developing countries is to distribute to them most, if not all, of the saving accruing to developed countries from the issue of costless Special Drawing Rights (SDRs) as a means of international payment.

The Special Drawing Account of the IMF was established in July 1969. To date there have been only two major allocations of SDRs, both spread over three years. The first was between 1970 and 1972, totalling 9.3 billion SDRs, and the second was between 1979 and 1981 of just over 12 billion SDRs, giving a total allocation of 21.43 billion SDRs, equal to approximately 4 per cent of total world reserves other than gold. The basis of allocation of SDRs between countries is the member countries' quota subscriptions to the IMF. This means that approximately 70 per cent of the new international money created is distributed to the world's richest twenty-six countries, while the poorest countries participating in the IMF receive only 30 per cent. If SDRs were distributed on a *per capita* basis, the distribution would be almost exactly the reverse. What appears to be an arbitrary distribution of new international reserves is explained by the fact that SDRs, as originally conceived, were designed primarily to increase the total level of international liquidity, not to alter the distribution of total reserves or to effect a permanent transfer of real resources from one set of countries to another.

The return to the use of SDRs by countries depends on the rate of return on resources and on the interest rate payable on the net use of SDRs. The potential resource gain is measured by $[(r - i)Q]/d$, where r is the rate of return, i is the interest rate payable on SDRs, Q is the value of SDRs allocated, and d is the discount factor. If there was no interest rate payable on SDRs, all the social saving would go to the net users of SDRs. If the rate of interest is positive, some of the social saving is transferred to those who accumulate SDRs. If the rate of interest on SDRs equals the return on resources, the effect on resource allocation would be neutral between net users and net holders. Thus the system at present instituted involves resource transfers only to the extent that the interest rate payable on the net use (holding) of SDRs is lower than the market rate of interest (opportunity cost of capital), so that countries that accumulate SDRs are effectively transferring resources to those countries that run them down. The interest rate originally payable on net use was 1.5 per cent, but this has been gradually raised through time, in order to make the SDR a more acceptable asset to hold, and now both users pay, and holders receive, a market rate of interest based on interest rates prevailing in the US, UK, France, Germany and Japan. Net use still enables countries to run larger balance-of-payments deficits than otherwise would have been the case, and eases the adjustment problem, but the grant element attached to SDR use has now gone. The rules on use are that while a country may now use the whole of its SDR allocation, no country is obliged to *hold* more than three times its own cumulative allocation. But the obligation to accept SDRs involves the provision of currency in exchange. The idea is that SDRs should be used primarily to meet balance-of-payments needs so that most SDRs end up in the hands of surplus countries. The accumulation of SDRs by a country is not necessarily an indication, however, that the country has transferred real resources to the same extent. That depends on where the currency it surrenders in exchange for SDRs is spent. The holdings of SDRs by groups of countries is shown in **Table 16.5**.

It can be seen from the table that the holding of SDRs in the industrial countries is over five times greater than in the developing countries. The industrial countries have been net users of SDRs, as well as the developing countries.[1] The actual net use by the developing countries has been approximately 2.8 billion SDRs, or just over one-half of their allocation. This does not necessarily mean a resource transfer of this order of magnitude, however. First, interest payable must be deducted. Second, whether transfer takes place to the group as a whole depends on whether all the currency acquired in exchange for SDRs is spent in countries outside the group.

Table 16.5 *The Holding of SDRs, 1990*

	Holdings
Industrial countries	17 615
Developing countries	2 739
of which:	
Africa	84
Asia	904
Europe	70
Middle East	951
Western hemisphere	730
Total allocation	20 354

Source: *International Financial Statistics*, Year book 1991.

There can be no doubt about the advantages of the SDR system for the world as a whole, but there are several objections to the present distribution, and grounds for believing that a redistribution of SDRs in favour of the developing countries could improve world welfare. The advantages of SDRs compared with the gold and dollar standard are self-evident. SDRs make possible orderly reserve creation and rid the world of a system dependent on supplies of gold and the balance of payments of reserve currency countries. SDRs cannot be demonetised (like gold) or vanish as when dollar are spent in the United States. They are also costless to produce, unlike gold, which requires real resources to be mined, refined, transported and guarded. Above all, SDRs represent the abandonment of the idea that attached to international money there must be a debtor. Acceptability by others is the important thing, just as a nation's payments system depends on the acceptance of unbacked paper money.

The objections to the present distribution of SDRs should be equally axiomatic however. The IMF quotas on which the allocations are based were not developed for the purpose of distributing

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[1] The difference between total allocations and total holdings is accounted for by Other Holders and holdings by the General Resources Account of the Fund. Other holders include the World Bank, the IDA and the Bank for International Settlements.

SDRs. They were developed for the purpose of assigning voting power at the IMF, for determining each member's contribution to the Fund's resources, and for determining maximum borrowing limits from the Fund. The quotas were based on the degree of convertibility of each nation's currency, its national income, its original level of convertible currency holdings and its importance in world trade. There is no necessary relation, therefore, between the quotas and the criteria by which one might wish to allocate new international liquidity, such as the relative costs of balance-of-payments adjustment, the long-run demand for international reserves, and in particular the distribution of world income (given that SDRs represent a social saving compared to the use of gold). The balance-of-payments adjustment costs of developing countries are generally higher than those of developed countries, and this in itself constitutes an economic argument for revising the present allocation rules. The more important question, however, is how the social saving should be distributed. The present rules for allocation, in effect, distribute the social saving to individual countries in proportion to their contribution to the social saving created; that is, in proportion to the demand for SDRs. If the supply of SDRs to individual countries equals their demand, no resource redistribution between nations will occur. But in the light of the present distribution of world income, why should not the whole of the social saving be transferred to the developing countries? As Williamson (1973) has argued, the degree of egalitarianism needed to justify this course rather than neutrality is minimal. The developed countries would be no worse off than if new gold had been discovered and then sold to them. Swapping SDRs for exports to the developing countries is just another way of converting resources into reserves. Machlup (1968) puts it this way:

> Under the gold standard, industrial countries earned increases in their gold reserves through export to South Africa; workers in mines and refining plants (and, of course, also managers and stockholders) received the equivalent of what the industrial countries exported in exchange for the gold. Under a system of allocating fiduciary international money to developing countries, industrial countries would earn their new reserve assets through exports to any of the developing countries that spend the allocated money; workers in development projects, such as in the construction of highways, schools, or hospitals would receive goods and services equivalent to the industrial countries' exports. The effect on the industrial countries would be the same in both cases; the effects on the developing countries would differ in that the development projects may sooner or later help to increase the productivity of their people . . . the point is that the benefit from creating costless money must accrue to someone and who should be the beneficiary is necessarily an arbitrary decision.

As Triffin (1971) has argued, internationally agreed SDRs should serve internationally agreed purposes, one of which could be that the social saving of SDR creation should accrue to the developing countries. Machlup also argues that there are strong political arguments for combining assistance to developing countries with reserve creation in one package given that it may be politically difficult to get countries to agree unilaterally to increase their level of foreign assistance.

The feeling that the social saving of SDRs should be distributed to the developing countries has spawned several proposals for a so-called **link between development assistance and SDRs.** If more resources are to be distributed to the developing countries on account of technical progress in the international payments industry, there would indeed seem to be several advantages in establishing an aid link with the use of SDRs.

First, if there was a regular expansion of SDRs a link would provide a useful mechanism by which total development aid could be guaranteed to rise with the long-term growth of world trade and production. At present there is no guarantee that aid will rise proportionately with world income. Aid programmes get chopped and changed according to the balance-of-payments situation of donor countries.

Second, a link scheme would increase the proportion of total international aid that is untied. Even if normal budgetary appropriations for aid were cut as a result of the link scheme, the link would still yield a net benefit in that the real value of the aid would be increased through untying. Moreover, the untying of aid through the link would not impose any reserve losses on the donor, as when a country unties its aid unilaterally. All donor countries will gain reserves in exchange for the exports they provide to the developing countries.

Third, if the link scheme operated through such international financial institutions as the World Bank or one of its affiliates, these multilateral institutions would be provided with a regular flow of resources without the necessity of entering into time-consuming negotiations with national governments.

The historical origin of the link idea can be traced back to Keynes's plan for an International Clearing Union (ICU) with the power to issue international money. The function of the ICU was not only to be a world central bank but also to lend to international organisations pursuing internationally agreed objectives, in particular, at that time, for post-war relief work and the management of international commodities. The most recent spate of proposals for relating development assistance with international monetary reform, however, started with the Stamp Plan in 1958 (Stamp (1958)), which was for the issue of IMF certificates to increase international liquidity, but distributable directly to the developing countries. The developing countries would gain purchasing power, and the developed countries would have to earn the certificates by exports to the developing countries in the same way that they would have to earn gold or dollars by exports.

The variety of link proposals that have been put forward since 1958 can be classified into three types: proposals for (i) **a direct link**; (ii) **an organic link**; and (iii) **an inorganic (or indirect, voluntary) link**. As far as a direct link is concerned the simplest method would be to allocate more SDRs directly to the developing countries in excess of their long-run demand for reserves. This could be accomplished in several different ways. The IMF quotas to developing countries could be increased, while retaining the quota structure as a basis for SDR distribution. Alternatively, the developing countries could be allocated SDRs in excess of their IMF quotas according to some agreed formula. The direct approach, which was the essence of the Stamp Plan, has much to recommend it compared with the more complex alternatives.

An organic link refers to the possibility of channelling SDRs to the developing countries either via the developed countries directly, or via international institutions directly, or via both. UNCTAD (1965) first suggested the notion of an organic link whereby the IMF would issue Fund units to all member countries in return for national currencies deposited with the Fund, which could then be used for purchasing World Bank bonds or for distribution to the International Development Association, thus providing additional (and cheap) resources for multilateral development projects. Many other forms of organic links have since been suggested: e.g. the direct allocation of SDRs to development agencies; the allocation of SDRs by developed countries direct to the developing countries; and the allocation of SDRs by developed countries to development agencies. The direct allocation of SDRs to development agencies probably has the most advantages and the least drawbacks among the organic-link proposals. Development agencies would have accounts with the IMF to which SDRs would be credited. The development agencies would then lend in the normal way. When goods were purchased from exporters by the developing countries, the IMF would then transfer the SDRs from the account of the development agencies to the account of the exporting country. The country would then pay its exporters in its domestic currency. The scheme has the advantage of being simple and could be introduced with minimal amendments to the IMF Articles of Agreement.

A tied version of the organic link which bears some similarity to the UNCTAD proposal was Scitovsky's early plan (1966) that new international currency should be issued to deficit countries with unemployed resources which would relinquish domestic currency in exchange which could then be lent to the developing countries but which could only be spent in the issuing country. This would serve several purposes. It would provide the developing countries with unrequited imports at no opportunity cost to the developed countries and remedy the deficits of the developed countries at the same time. The idea of Scitovsky's scheme was to eliminate deflationary bias in the world economy, but it remains relevant as long as some countries exist with unemployed resources but needing reserves. The main disadvantage to developing countries compared with alternative schemes would be that the resource transfer involved would be in the form of tied gifts.

An inorganic link would involve the developed countries in agreeing to make voluntary contributions to the multilateral aid-giving agencies whenever new SDRs were allocated. The contributions would be in national currencies but would represent a uniform proportion of each contributor's SDR allocation. The drawback of the proposal is its voluntary nature and that one or two major countries may not contribute or might make their contribution dependent on their balance of payments. This would introduce a great deal of uncertainty into the scheme. Also national governments would have to agree appropriations and this would create the same difficulties as regular foreign-aid appropriations. There would not seem to be much advantage in an inorganic link.

Several objections have been raised against the link proposals but none are very convincing. Some have argued against the link on the grounds that the creation of reserves should be kept separate from the transfer of real resources. But this has never been the case historically. Resource transfers have always been involved in the acquisition of gold and dollars. Since SDRs save real resources, it is entirely appropriate that in the process of reserve creation the saving should be distributed to the developing countries.

A second objection expressed against the link is that it would relinquish democratic control over the granting and distribution of assistance by national governments. Under the link scheme, the distribution of the burden of assistance depends on where the SDRs are spent, which, it is argued, cannot be accurately forecast in advance. This is a weak argument for two reasons. The same objection can be levelled against all forms of untied aid given bilaterally, and also against tied aid to the extent that tying is not 100 per cent effective. There is never any necessary correspondence between the financial burden of aid and the real resource burden of aid. It all depends on whether the national governments which grant aid allow the resources to be transferred, which depends primarily on their policy towards the balance of payments. But in any case, the theory of democracy and the concept of mandate extend to the international sphere. As Haan (1971) has argued, there is no reason why a government cannot be given a mandate to distribute international money to the developing countries even though the impact on the country may be uncertain.

A further objection is that the link is likely to be inflationary. If SDRs are replacing gold and dollars, however, there is no reason to suppose that SDRs will be any more inflationary for the world economy than the existence of gold and dollars. It is true that developing countries will tend to spend new international money rather than add to their reserves, but whether the resulting claims on the developed countries are inflationary or not depends on whether the developed countries are willing to release resources to the extent of the claims on them. The reaction of the responsible authorities will hardly depend on the source of the asset creating the pressure. It is thus highly misleading to argue, as Bauer (1973) does, that because, unlike ordinary aid, the direct nexus between SDRs and real resource claims is broken that corresponding measures to offset inflationary effects are less likely. All sorts of unforeseen factors can disturb an economy. The (uncertain) claims arising from SDR distribution to the developing countries are likely to be trivial in comparison. The sums involved are certainly trivial in absolute magnitude, which further casts doubt on the inflation argument. Even if the whole allocation of SDRs of, say, $3 billion a year was distributed to the developing countries, this would still represent only 0.16 per cent of donor countries' national income. There are, in fact, several reasons for supposing that the link may reduce inflationary pressure in the world economy. SDRs could be less inflationary than the dollar standard by substituting multilateral control over international liquidity for unilateral control by the United States, which, because of the need for dollars, has not been subject to anti-inflationary discipline normally present in other countries. It may also be that fewer SDRs will be created with a link than without. If the developed countries must earn their new reserves they are likely to be more modest in their views on the need for more reserves. If countries must earn reserves there will also be some compulsion on them to contain inflation in order to compete in world export markets.

A final objection raised is that the total of development assistance is not likely to rise under the link because governments will cut down on their normal budgetary aid appropriations. Critics argue that it is highly unlikely that developed countries would be willing to give extra aid through the link but not in other forms. This objection can also be challenged. For one thing the reserve effects of the two forms of assistance are not the same. Conventional aid worsens the donor's balance of payments, whereas the link scheme would improve the balance of payments of countries where SDRs were spent and thus improve the reserve position. Second, governments often wish to provide aid for specific purposes and this desire would not be diminished by a link. Moreover, since it is very difficult for a country to know how much aid it is providing through the link, it would be very difficult for a country to offset it. The link deserves much more consideration in international monetary circles than it has at present received. If ever there was an instrument in search of a policy it is SDRs.

Questions for Discussion and Review

1. What does the demand for a country's exports and imports depend on?
2. Can the devaluation of a country's currency guarantee balance-of-payments equilibrium on current account?
3. What is the case for a dual exchange rate in a developing country?
4. What factors determine the income-elasticity of demand for a country's exports?
5. Why are developing countries more prone to balance-of-payments disequilibrium than developed countries?
6. What criticisms have been levelled against the IMF in its policies of support to developing countries?
7. How could Special Drawing Rights be used simultaneously as an instrument of aid to developing countries and as a means of employment creation in developed countries?
8. How does the IMF's Compensatory and Contingency Finance Facility Work?
9. If some countries have deficits, others must have surpluses. How could these surplus countries be forced to bear more of the adjustment burden?
10. What do you understand by the IMF's 'Supply-Side Approach to Devaluation' in developing countries?

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